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EPTEMBER 1997

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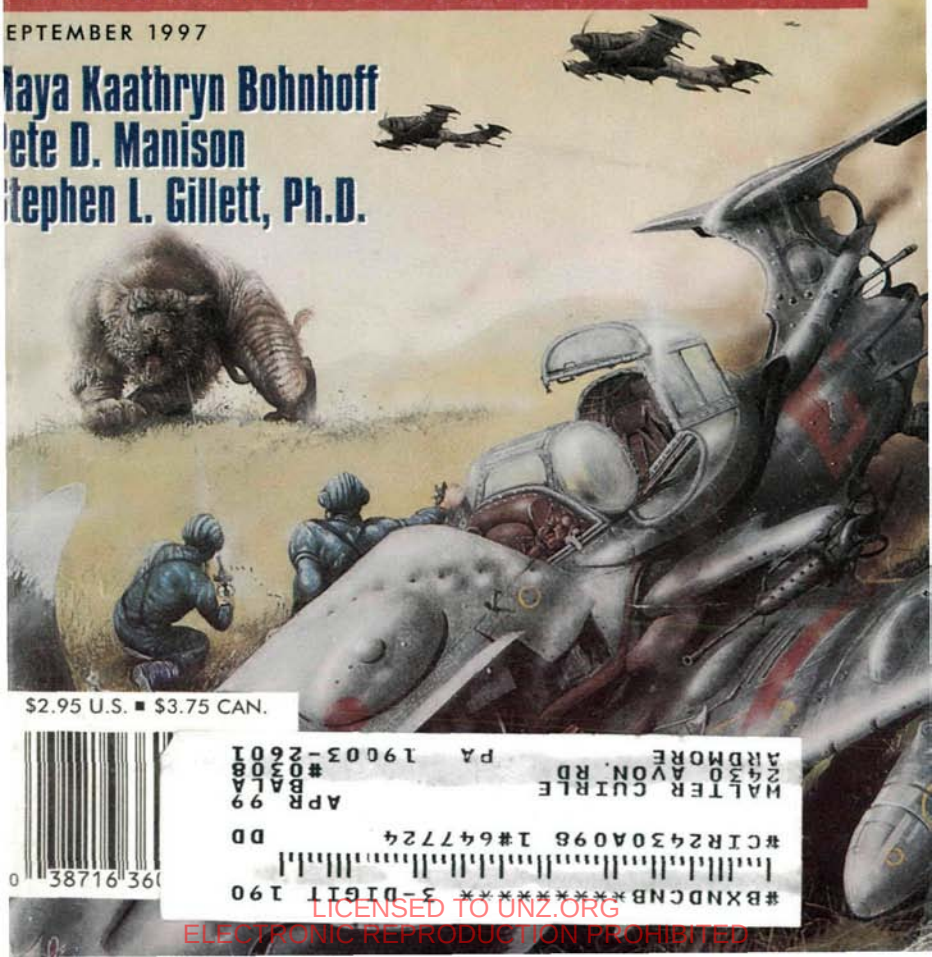

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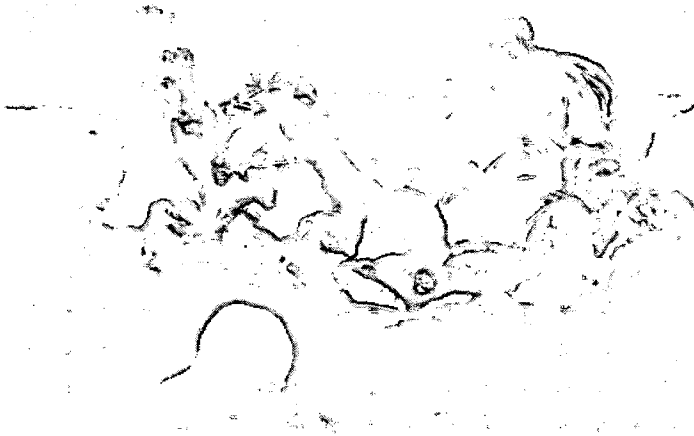

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SCIENCE FICTION AND FACT

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NEW PAPERBACKS

ASPECT

WHERE IMAGINATION KNOWS NO BOUNDS

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NATURE VERSUS AND NURTURE

Even in high school, I thought the "nature versus nurture" argument sounded remarkably silly. How could otherwise intelligent and responsible adults seriously argue over which—heredity or environment—determined people's nature and character? It was all too obvious to me, even with my limited knowledge of genetics and experience with life, that *both* played important parts. Even if it was possible to establish that one or the other played a larger role, it would be folly to pretend that either could be ignored when trying to figure out how people became who they are.

I still think so, so I won't dignify the old argument by resurrecting it and taking one side or the other. Unfortunately, I don't have to resurrect it, because others have already done so. For a while I had naively thought this silly either-or argument had gone away, but it's back in full force. People are once more saying the most ridiculous things, not only with straight faces, but with vehemence that sometimes verges on violence—and with carefree disregard for facts or scientific method.

Analogies are never perfect, of course, but consider how a ten-year-old car became what it is. The first determinant is the design; some cars are simply better engineered than others. No less important is the quality of the materials and workmanship that went into converting the paper plans into an actual structure of metal and glass and plastic and rubber. A car made with careless disregard for the details in excellent plans, or using inferior materials, may be no better than one lovingly crafted from a mediocre design.

And that's just coming off the assembly line. The car's condition and reliability ten years later will depend not just on how it was designed and built, but on how it was driven and cared for. One that has constantly been subjected to screeching starts and stops, and never given an oil change or tune-up, has little chance of being in as good shape as one driven carefully and maintained conscientiously.

Few people would dispute these claims for cars, because people aren't cars and therefore don't take the arguments personally. But just try making carefully reasoned, closely analogous arguments for people!

And there *are* close analogies. Heredity—the genetic blueprint in DNA—corresponds quite closely to the plans from which a car is built. It defines fundamental limits within

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which an individual can develop, by defining a wide range of bodily characteristics such as body type and color of skin, hair, and eyes. And, as anyone's experience with those characteristics will readily confirm, it *does* vary significantly from individual to individual. A person with the wrong combination of genes *will* suffer from hemophilia; and the last I heard, nobody had found any way to change that unfortunate fact by tinkering with the victim's environment.

Which is not at all the same as saying that Heredity Determines Everything and Environment Counts for Nothing. While the genetic blueprint defines how a new person is supposed to be formed, the execution of many of its instructions can be modified by environmental influences. This can happen either before birth ("in the factory"), or anytime afterward ("driven off the lot"). A fetus may fail to develop properly either because of genetic mutation caused by influences such as radiation or mutagenic chemicals, or because the mother's diet fails to provide materials the fetus needs to carry out the genetic instructions—much as a car may fail to live up to design specifications because somebody misread a dimension or used flimsy plastic where heavy sheet metal was called for. A car "born" one color may later change to a different one by being repainted or rusting; a person, by spending a lot of time in the Sun. A car that never gets enough exercise, in the form of lengthy runs at highway speeds, may eventually suffer from carbon buildup in its engine; a person, from plaque buildup in arteries.

Most people, I suspect, can listen to most of what I've said so far without being violently offended—because the characteristics I've used as examples are "purely physical." The fur begins to fly when you raise the question of whether psychological characteristics are similarly subject to both genetic and environmental influences. One reader told me about a movement to get rid of a university president in his area because he had publicly expressed the opinion that intelligence might be determined, at least in part, by heredity. The reader wrote a letter to the editor of his local paper defending the professor's right to free speech "no matter how repulsive that speech may be," but wondered whether the person he was defending was actually promoting a scientifically defensible theory or just

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using academic freedom as a cover for racism.

Unfortunately, by the time I expressed an interest in seeing more details of the case, the reader no longer had the original articles. So I can document neither details nor disposition. Let us suppose for the sake of argument, though, that there *was* such a case, and consider its merits. On the basis of the little the reader told me, I see neither racism nor cause for revulsion. The professor, as I understand the reports, seemed merely to be trying to restore a modicum of intellectual balance and honesty to a kind of discourse that has lately been distorted grotesquely by the mania for "political correctness." (Note added in production: One of our proofreaders thinks he recognizes the case in question as one in which an academic did claim that "blacks need more help than whites because of their inferior genetic inheritance," or words to that effect. If true, that's a statement that I can't defend—but it's not at all equivalent to the claim that intelligence probably has a genetic component, which I *will* defend.)

The idea that heredity influences intelligence is one that long seemed, on the basis of a great deal of experience, clearly true. In all the recent furor, I have heard no refutation of that experience, nor any evidence that intelligence is independent of heredity. And despite the current fashion for hurling the word "racism" at anyone you disagree with, the idea of a connection between heredity and intelligence does not necessarily have anything to do with race, much less racism.

Intelligence is an *individual* characteristic, determined, like any other

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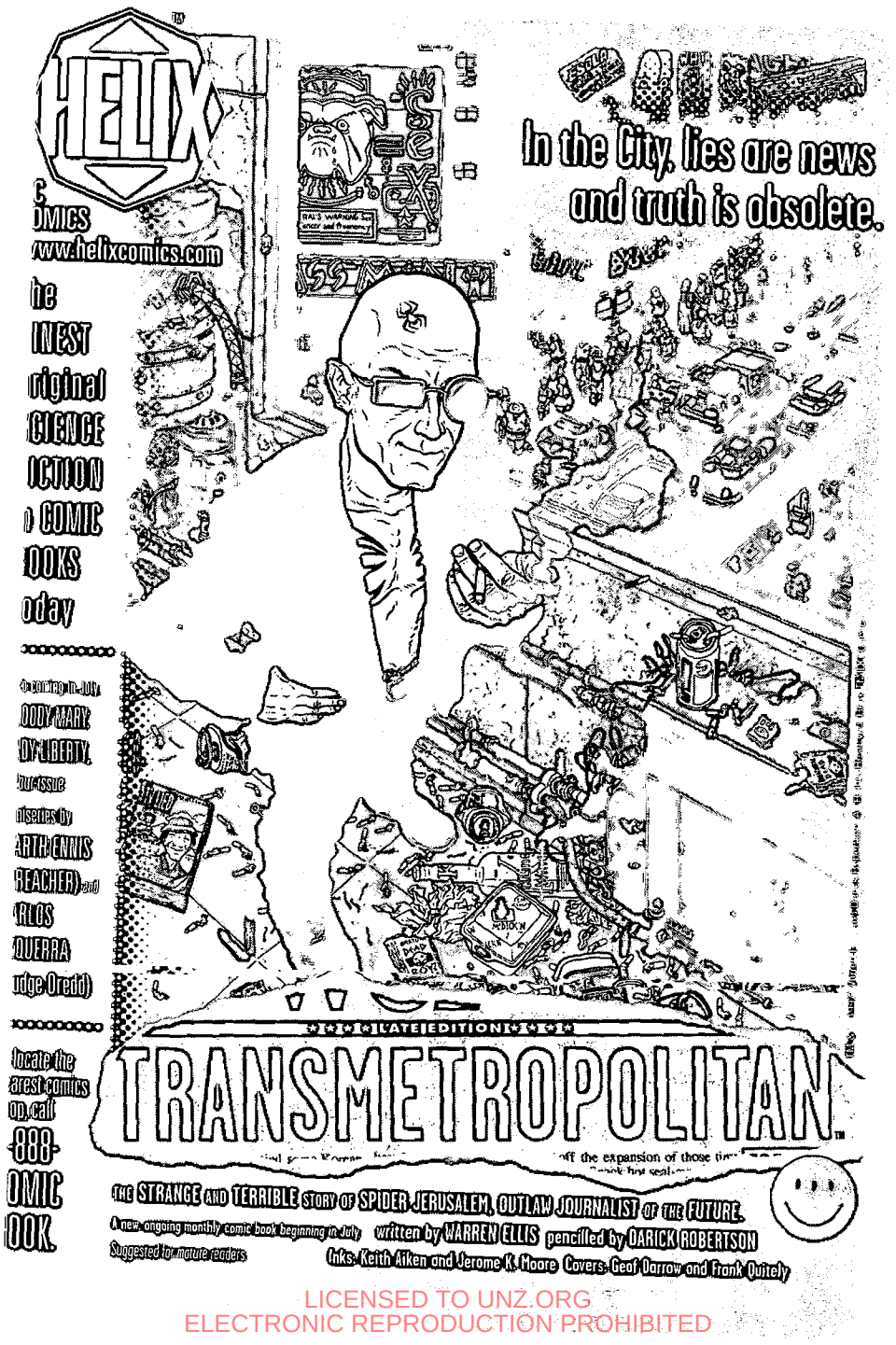

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human characteristic, by a combination of what equipment a person is born with (heredity) and what subsequently happens to modify the condition and functioning of that equipment (environment). There's plenty of evidence that a brain that gets a lot of stimulation and exercise, just like a heart that gets a lot of stimulation and exercise, tends to work better than one that doesn't. But the fact remains that the initial physical characteristics of either brain or heart—the "hardware," so to speak—are determined primarily by the genetic blueprint from which they are built, possibly with some modification by such things as toxins ingested during pregnancy.

The idea that genetic makeup plays no role in determining individual differences in intelligence is tenable if and only if that genetic blueprint, and consequently the hardwiring of the nervous system, is identical for all human beings. This is not true for any other human characteristic I've heard of; in fact, it can be quite dramatically false. Recent studies have found that individuals' senses of taste vary greatly because of fundamental differences in the number and arrangement of their taste buds (and associated nerves). Why should genetic identity be universal, magically and mysteriously, for intelligence and *only* intelligence? And where is the *evidence* that this is true? Until shown a sound theoretical reason, or observational evidence, or both, I must reject the politically convenient *ad hoc* notion that intelligence, alone among all human traits, is exempt from any genetic influence or variation.

Furthermore, humans have long engaged in breeding other species of animals, such as dogs and cats and horses, to achieve a high probability of selected characteristics—including intelligence. Their methods are well established and continue to be used because *they work*. They don't produce vast numbers of identical individuals whose minds work exactly the same way, regardless of training and experience; but they do enable the production of litters with higher-than-average incidence of higher-than-average intelligence, by whatever measure you might use.

How can humans apply those principles to the breeding of other animals, yet deny that they have any relevance to themselves? Are humans, alone among all animals, somehow exempt from the demonstrable correlations observed in so many other species, even though their heredity is based on the same genetic mechanisms? Where is the *evidence* that this is so? Where is a reason why it *should* be—other than that people want it to be? (Actually, despite the current unpopularity of any terminology that gets anywhere near "eugenics," many people *do* apply the principles of breeding for intelligence and related traits to themselves. They might be horrified if you suggested to them that they were doing so, but the fact remains that bright people planning to raise families tend to seek out other bright people to do it with—and then raise more than the average percentage of brighter-than-average children.)

Nothing in the last four paragraphs

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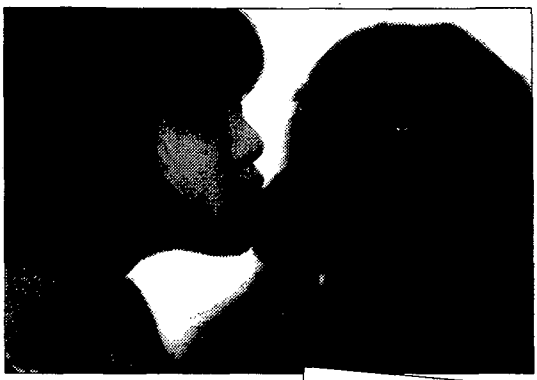
Is It Okay to KISS YOUR DOG?



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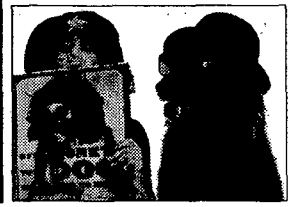

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has even mentioned "race," so why do critics of people like that allegedly outrageous professor cry "racism"? Here's how my *American Heritage Dictionary* defines that word:

1. The belief that race accounts for differences in human character or ability and that a particular race is superior to others.

2. Discrimination or prejudice based on race.

The only possible connection I can see (and the word "far-fetched" leaps to mind) is this. Suppose you grant the possibility of individual intelligence being determined partly by heredity, and you recognize the existence of "races"—a slippery term at best, meaning little if anything more than loosely defined subpopulations that constitute more or less separate gene pools. Then it is conceivable that somebody will do a statistical study and find that the average value of some number purporting to measure intelligence is higher or lower in one group than another, just as the average level of skin pigmentation is higher or lower in one group than another.

I am *not* saying that they would, or that they wouldn't: I don't know, and I don't care. It's irrelevant. *Individual* heredity determines individual qualities, which are what individuals should be judged by. Membership in a particular statistical group—or race, if you want to call it that—does *not* in any way determine an individual's character or ability, or imply that that whole group is any way superior to any other group, or justify discrimination or prejudice based on race.

In other words, it is a simple observational fact, supported by a well-understood and well-tested theoretical basis, that intelligence does depend to some extent on genetics—and that fact has absolutely nothing to do with racism.

Intelligence is only one area in which nature and nurture have been too often lately linked by the inappropriate word *versus*. When *Analog* published Stephen L. Burns's short story "The Wait" (January 1997), about a woman faced with the decision to have her unborn baby's "gay gene" "fixed," we got an interesting collection of comments on whether nature or nurture caused homosexuality. One reader astutely observed that some people have a desperate need for there to be a gay gene, while others have just as desperate a need for there not to be. Not surprisingly, most of the letters we received seemed to fall into one or the other of those categories.

At least one took us to task for publishing the story on the grounds that "a study has shown" that there is no such gene, but ignored numerous other studies that suggest that there is. At least one other letter cited a study of twins that suggested a strong but imperfect correlation between genetics and sexual orientation; the writer chose to interpret that as meaning that even if there is *some* genetic component, it's unimportant. To some of us with no ax to grind one way or the other, the diverse results of studies so far suggest that both nature and nurture play significant roles, but nobody yet really knows their relative importance or how they interact. Burns's story hypothesized one possi-

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ble outcome of further research and explored the consequences—which is precisely one of the classic functions of science fiction.

To me, the disturbing point about all these discussions is not any of the possible answers, but the fact that people are trying to force the questions to fit the answers they *want* rather than the ones the Universe actually provides. Whether you're talking about intelligence, sexual orientation, or whatever hot button is fashionable tomorrow or next week, the chances are very good that *competent* research will find that it's significantly influenced by *both* genetics and environment. Trying to pretend that it's all one or the other because you want it that way, and trying to justify either viewpoint by flaunting the studies you like and dismissing the ones you don't, isn't science. It's anti-science—and science is one of the most powerful tools we have, one that we abuse at our own peril.

But science is about learning what *is*, not finding systematic ways to convince yourself that things are the way you'd like them to be. ■

Experience is what you get looking for something else.

—Mary Pettibone Poole

Nothing in life is to be feared. It is only to be understood.

—Marie Curie

Every time we liberate a woman, we liberate a man.

—Margaret Mead

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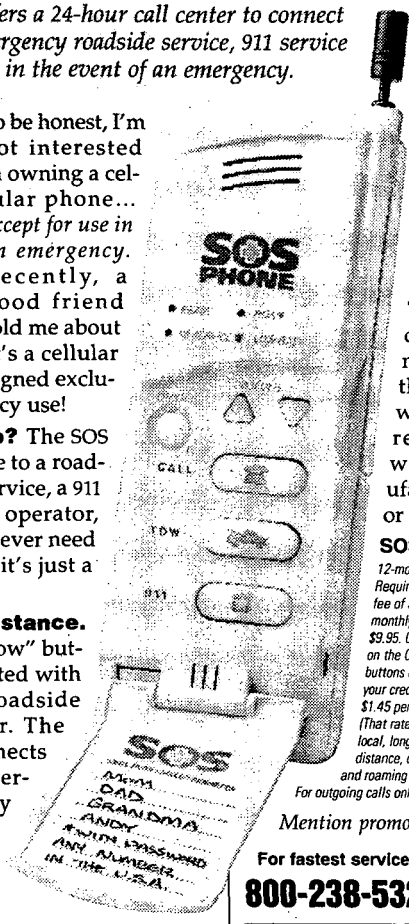

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Any principle can have practical applications—even "truth is stranger than fiction"!

Plummeting through the predawn sky, all Qtzl could think of was that his family would never know what had happened to him. He would burn his epitaph across an alien sky alone, while the only eyes that would see him—alien eyes—would mark him as a meteor.

It didn't happen quite that way. He managed to bypass his malfunctioning navigational array, regain control of the craft before it began to disintegrate in the atmosphere of the planet, and fire up his braking field. It made his descent more spectacular, but slowed the ship. He downed it in a labyrinthine maze of mountains and sat quaking, but alive, wondering what he ought to do next.

"Qtzl," Ship said. "You are alive."

"Indeed. Thank you."

"Your vital signs are quite strong, though your respiration is a bit elevated. May I recommend that we attempt communication with any nearby comrades?"

"Do that." Qtzl glanced around, discomfited by the sound of hissing from somewhere to the stern of the small craft.

"Communication impossible. Order disregarded."

Qtzl brought his eyes back to the spherical console display. "Impossible? Why did you recommend we attempt it, then?"

"Protocol," Ship said, and managed to sound reproachful. "May I recommend that you get out and reconnoiter?"

"No, thank you. I'd rather not find out, for the sake of protocol, that reconnoitering is as impossible as communication."

"The planet's atmosphere is breathable," Ship informed him, reproach thickening. "I repeat: I recommend that you get out and reconnoiter."

Qtzl did that, if for no other reason than that the continued hissing from astern made him nervous. Outside, he could see that the damage was severe. The bow planes used for atmospheric maneuvering were sheared off and the landing cradle had failed, dumping the craft onto its braking-field generator. The communications array was smashed beyond recognition and steam oozed from a seam behind the cabin.

"Damage report," he ordered, trying to sound authoritative rather than frightened. "Source of steam."

"Environment controls disabled . . . coolant chamber breached."

Qtzl took a step backwards. "Are you likely to explode?"

"Likely? That is a judgment call. Likelihood of explosion, twenty to one against."

"Possibility of repair?"

"Repair necessary to continued functioning."

Qtzl tried to swallow around the dry patch in his throat. "No, no. I

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mean, what's the possibility that I could repair you?"

"You installed my navigational array," Ship said.

Qtzl colored all the way to the tip of his crest. "Point taken," he said and trudged off in search of shelter, cursing his mechanical ineptitude. This was like a grade-B *ixltl*—foolhardy adolescent stranded alone on an alien and possibly hostile world, no way of contacting his loved ones. Alone against—

"Ship, life-form readings, please."

"You are surrounded by an abundance of small life-forms, Qtzl."

"How small?"

"Very small. The largest is approximately eight *ixiqs* long and four *ixiqs* in height."

"Intelligent?"

"Intelligence is a relative concept. Could you be more specific?"

"Are they people?"

"No people are present."

Qtzl sighed, ruffling his neck frill. Someday perhaps, ship consoles would be less dogmatic. "I need shelter. Could you—I mean, please locate shelter."

Ship was silent for a moment, then said, "There is an artificial structure 100 *ititxiqs* to the east."

Qtzl's blood froze. "Artificial?"

"A domicile. It is vacant . . . presently."

Qtzl was both excited and fearful as he approached the domicile. It was perched near the top of a wooded slope, hemmed in by what he assumed were trees; only the second story's high, peaked roof nudged above the many branches.

He entered through a door screened by flowering plant life. The building was, as Ship had said, vacant, but not empty. It was full of furnishings—some comfortingly and eerily familiar, others whose uses Qtzl could only guess at.

He was at once unnerved and delighted. A *person* lived here! An alien person whose dimensions were not unlike his own. He wondered how soon the alien would return. He opened his mouth to ask Ship, but realized Ship would only say—with impossible condescension—that it was not omniscient. That fact bothered Qtzl deeply just now.

His senses told him that no food had recently been prepared here and there was a fine layer of dust on the furnishings that spoke of disuse. Perhaps this was someone's sabbatical refuge. His explorations revealed much of interest. There were but two small sleep chambers (or so he took them to be) with one padded pallet apiece. Both were flat; Qtzl couldn't imagine sleeping on them. He was boggled by the number of belongings this alien had accrued.

He was also boggled by what he took to be representations of the planet's natives. Although there were images of a number of fur-bearing animals—chiefly hanging within frames on the walls—by far the preponderance of pictures were of a bipedal, bilaterally symmetrical being that wore fur only on or around its head and which possessed two eyes, a small mouth, and a pointy, erect nose. They were neither terrifyingly ugly nor mesmerizingly beautiful, despite what

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the popular *ixltls* suggested to the contrary. But they were undeniably alien. Except for the eyes, Qtzl found the faces mystifying; without a neck frill and crest, how could he ever hope to read their emotions? Creator willing, he would never have to try.

During his meal of synthesized rations, Ship informed him that it had been doing some calculations. "Repair is possible," it told him, and proceeded to rattle off a list of necessary materials. "Needed metals, minerals and chemical compounds are present in this planet's mantle. They are also present in the artifacts found in this domicile, which indicates that the natives mine and refine them. This society would appear to be fairly advanced in metallurgy and chemistry. It should not be impossible to effect my repair."

"But will I be able to do it?"

"I will offer instruction and guidance," said Ship, and Qtzl imagined smugness in the tone.

"How do I go about obtaining the materials?"

"I have no idea."

Kerwin Frees was a UFO chaser. He was a card-carrying member of MUFON. He was also a card-carrying member of CSICOP (which he referred to lovingly as "the psy-cops"), and saw no contradiction in the dual membership. He was both skeptic and true-believer but, at the moment, the true-believer was dominant, for Kerwin Frees was certain he had just seen a UFO land in the deep, piney woods beyond the south shore of Lake Tahoe.

He had not been chasing UFOs when he witnessed the long trail of light arcing from the heavens. He had been lying on the hood of his Saturn stargazing, drowning his senses in the immensity of the Universe and sipping a beer, figuring that next month when the tourists and fair-weather Tahoe-ites began to arrive, he would go to Montana where a rash of sightings had recently occurred.

He was immediately galvanized. The beer was forgotten. He had just enough time to lift his field glasses and track the fiery object's fall. Most people would have taken it for a meteor. Kerwin Frees did not make that mistake. The trajectory was all wrong, suggesting at least a partially controlled descent; its trail flattened out before disappearing behind a wooded ridge. It was not a jet—no jet had ever plummeted from that distance. It was not a space shuttle—he knew this because he had the shuttle schedule (hacked out of a NASA computer) memorized.

Kerwin Frees poured out the remains of his beer, tossed the can into the recycle bin in his trunk, and shut himself into his car with his CB radio.

Qtzl slept curled in a large cup-shaped chair. He did not sleep easily or well, and was up before daybreak exploring his borrowed lodgings and pondering his predicament. On his own, he came up with the idea that Ship's Field Remote Unit should scan the foodstuffs in the alien's larder, and he found what looked vaguely like a computer in a cozy, cluttered chamber. The FRU confirmed the find. It *was* a

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computer of sorts, and was connected to some sort of alien network. Munching on some dry, crumbly white squares Ship had deemed edible, Qtzl watched the FRU (which looked, appropriately, like Ship in miniature) put the alien artifact through its paces.

"The machine incorporates no intelligence," Ship told him after exciting the boxy alien unit into a series of bleeps and chitters. "It models reality in simple binary languages which are relatively nimble, but not exceptionally powerful. . . . The network to which it is connected," Ship added after a long pause, "is, however, rather extensive. If you will allow me the time, Qtzl, I can explore the pathways. Perhaps I can determine a means of procuring the materials necessary for the repair of my transport module."

Qtzl allowed the time, and used it to his own purposes. Sometime in the middle of a fitful nap, Qtzl wakened to Ship's strident desire to share its findings.

"This society functions on a free-market system not unlike our own. I have located sources for the materials you need, and can arrange to have them delivered to this place."

"How?"

"Quite simply by placing orders into the computers of the various sellers. I already have experimented with such a tactic. The computers, lacking intelligence, do not question my addition of spurious orders."

"But . . . how will we pay for it?"

"We have nothing with which to pay for it," said Ship patiently.

"But that's stealing," Qtzl objected: "I won't steal."

"Then you will not get home."

"Stealing is reprehensible."

"Then we have a moral dilemma."

Qtzl rolled his neck frill and waved his arms in a gesture he hoped looked more impassioned than frantic. "Options! I need options."

"If you had some sort of legal tender, you could purchase the materials, and I could then place the orders legitimately."

"Good! What tender?"

"Apparently, this society functions with a multi-leveled equivalency system. Precious metals are the actual units of value; however, one does not use them directly in bartering."

Qtzl's momentary relief flagged. "You mean, I can't just go dig up some ores and do business?"

"Apparently not. The second tier of exchange involves chits called 'money' or 'currency,' which occur in a multitude of denominations and which are symbolic of the actual units of value. There is then a third level of exchange called 'credit' which exists solely as electronic information and which is symbolic, in its turn, of the currency. As nearly as I am able to determine, most business is conducted without any physical exchange of real property. All transactions are controlled by computers . . . which makes their lack of sophistication beneficial," it added after a moment.

Qtzl pondered this, then decided it behooved him to ask, "In order to purchase our materials, what must I have?"

"You must have an accumulation of this symbolic data in an institution known as a 'bank.'"

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There was no Tlvian equivalent for the word, so Ship simply said it in the language of the builders of the network. "Bank." It was a perfectly ugly word, Qtzl thought, sounding approximately like someone choking on *vetshmil*.

"And how," he asked, "does one acquire these symbolic units of value?"

"One works. When one works, one's employer deposits these symbolic units of value into the aforementioned 'bank.' The problem, of course, is that each employed individual is known to the system by a unique code which includes a name and a number."

Qtzl had not thought it possible for Ship to sound perplexed or uncertain. He revised that estimation now, and was far from happy about it.

Meteorite. That was what the police, the late-night news, and the next morning's newspaper labeled it. The only people who suspected it was anything else were fringers—crazies that used citizen band and the Web alike to report everything from abductions to Elvis sightings. It wasn't long before a simple arc of light had been transmuted into a dozen or more close encounters of various kinds, including detailed (and wildly different) descriptions of the aliens.

Kerwin Frees was an experienced hand at this. He knew how to read between the lines, how to suck an atom of truth out of many gross tons of fiction. He took careful notes of each description of the earthfall, paying special attention to where the correspondent claimed to be at the time of the sighting. If he was lucky he would be able to use the information to triangulate and fix the landing site.

"What are these?" Qtzl asked, staring at the screenful of scribbles Ship presented to him.

"These are job listings. People seeking employees let their needs be known by posting them on this Network. It is fascinating, Qtzl," Ship added, sounding almost enthusiastic. "These people are quite literate. *They* run the machines. The machines do not run them. Nowhere have I found a machine that is a decision-maker; they are merely implementers."

Qtzl was too lost in his own miseries to care about the state of machine intelligence on this alien world. "I can't read them," he said glumly. "It might as well be the scratchings of *zik-ziks*."

"I can read them," said Ship. "What sort of job would you like?"

"Academic."

Ship's FRU uttered a mechanical grunt. "An academic position? How are you qualified for such a thing? You've never held a job, and it would be arrogant to assume you could teach the natives based only on your perception of superiority."

"I *meant*," Qtzl interrupted, "that what kind of job I'd like is academic. I can't apply for *any* job. I can't appear in person. After all, I don't exactly look like a native, do I?"

"No, you do not. Therefore it will be necessary to obtain a position which does not require your personal attendance."

"Oh, certainly. And how am I to un-

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dergo the Sizing-Up without making a personal appearance?"

"I am not certain that this society observes that ritual." Ship was silent for a moment, then came back with a series of job listings highlighted on the computer screen. "Here, for example, are a number of entries which simply say, 'send résumé to' what I assume are surface coordinates. Several even allow electronic submissions."

Qtzl felt a stirring of interest. "So, assuming we find a job for which I'm qualified—then we tender my qualifications electronically?"

"Precisely."

Qtzl ruffled his neck frill in agreement. "Then let's find me a job that requires no personal appearances and which will pay well enough to cover the necessary purchases in a reasonable length of time."

Ship went to work immediately, which put it out of communication with Qtzl for an inordinate amount of time. Bored and fidgety, he resumed his exploration of the alien abode. He was afraid to go outside—even with Ship monitoring his every move—so he settled for a further tour of his absent host's belongings. In a small adjunct to the sleep chamber, he found some interesting garments which, for lack of anything better to do, he tried on. Standing before a reflective glass, Qtzl was admiring how the color of the robe he wore set off the turquoise of his skin when Ship beeped him. Hiking the long skirts, he hurried into the computer room.

"I have compiled a selection of positions for which résumés are requested and which do not rule you out by qualification," Ship told him. "It is a short list."

It was indeed a short list. A company located somewhere called Elk Grove needed an accountant, but Qtzl failed to see how anyone could keep track of imaginary units of value.

"Digits," Ship said (smugly, Qtzl thought), "are digits no matter where in the galaxy one goes. We will send a résumé there."

Ship had also found an engineering position and several programming slots with a large company that seemed to be doing research in space travel. "You are an above average programmer at home."

"But I don't know any of the languages their computers speak, Ship."

"*I* do, and what I know, I can teach you."

"Why bother?" Qtzl asked, feeling useless. "*You* take the job. I'll just . . . putter. Maybe explore the area." He conjured an image of himself as the intrepid explorer, charting alien territory.

Ship quickly dismantled it. "Qtzl, it would be extremely unwise for you to leave this domicile without my Field Remote. You simply would not survive. There are large, wild life-forms in the surrounding woodlands."

"You said there were only *small* life-forms in the surrounding woodlands."

"I have revised my assessment, and widened the range of my scan. There are large life-forms. Four-legged. And they move in packs of three to ten individuals."

Qtzl gave up the idea of exploring, intrepidly or otherwise.

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Ship fabricated and sent a sterling résumé based on a combination of Qtzl's expertise (a rather limited set) and its own. A week passed without positive response. All of the prospective employers had insisted on interviews; three told Ship it was overqualified.

"This is more difficult than I anticipated," Ship admitted.

Qtzl fanned his neck frill in frustration. "We have," he noted, "a limited amount of food left."

"However," Ship continued, as if Qtzl hadn't spoken, "I have found another employment opportunity. This one requests a résumé, a photo, and published clips from anywhere in the United States."

"United states. . . ?"

"A group of sovereign or semi-sovereign provinces which function as part of a federation founded upon the principles—"

"What's a 'photo'?"

Ship idled momentarily. "A two-dimensional representation of a person rendered on paper in a chromatic medium—"

"Published 'clips' . . . is that like published *writings?*" Qtzl's interest was piqued. He'd exhibited a flair for both prose and lyric during his school days. In fact, he'd won a number of essay contests and had published a few pieces of short fiction and philosophy. Not that anyone had noticed. . . .

Ship emitted the mechanical equivalent of a sigh. "The advertisement is from a city newspaper. A large one, judging from the estimation of its readership. They need a 'columnist'—that is, one who writes prose of philosophical bent and gives advice to the readers."

Qtzl twitched his crest. "Philosophy I can handle, but advice? About what?"

"It does not say," said Ship.

"I need a . . . 'photo,' you called it."

"Very good, Qtzl. Yes, 'photo.' You need one. And some examples of your prose."

"You have that in your database."

"Indeed. Shall I select a cross-section of your philosophical meanderings?"

As Ship's AI system was not programmed for wry humor, Qtzl was sure he must have imagined the barb. "Do that," he directed, feeling somewhat more buoyant. "I'll find a 'photo' somewhere. They're all over the backs of these . . . 'books.'" During his rambling exploration, he had found a volume with a representation of an Earth personage in shades of gray. He found it now, and carefully excised it from the book's glossy wrapping, using a foraged utility blade. By the time he had finished, Ship had produced several pieces of his finest commentary, and had come across sample advice columns in the newspaper's online archives.

"It is called 'Ask Angela,'" said Ship. "In it, a reader asks a question and Angela provides the answer."

"What sort of question?"

"For example, this female complains that after the birth of their first young, her mate has ceased to accord her the requisite attention due her. She is uncertain what to do to recapture his interest."

"And what advice does Angela give?"

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"She tells the female to decrease her weight and revitalize her . . . assets. This is an approximation, of course. This will, according to Angela, put something called 'pizzazz' back into the relationship."

"That's terrible advice! How can *decreasing* her body weight possibly *increase* her powers of attraction? A female is *supposed* to gain weight when she produces young. It's the natural indication of her elevated status. Doesn't this society have a mating codex? This female should sue for breach of attraction!"

"I am uncertain how this society handles their domestic matters. Perhaps the bearing of young is not as highly regarded here as it is at home."

"Nonsense. The society will not survive long that devalues its young." Qtzl stood and began to pace. "I shall not only tender my 'published clips,'" he decided, "I shall give a *real* answer to this question. Ship, read me the entire column."

Ship did, and Qtzl gave his own opinion about mates with wandering attention and the merits of a matron's physique. He recommended legal action only as a last resort, suggesting that some remedial classes in couplehood might help the woman's mate bolster his flagging attention span.

Scanning the photo of the Earth person for transmission, Ship said, "And what is the name of your alter-ego, Qtzl? Judging from the data I have accessed, Qtzl Fhuuii is not a common name here."

"Well, I think it should sound something like that other one, er, 'Ask Angela.'"

"'Ask' is a verb meaning to inquire. Angela is a name suggesting the columnist is a saintly being from the next world sent back to this plane to intercede on behalf of others."

Qtzl was impressed. "All that in three syllables! Is there a word in this economical language for a saintly being from *another* world who's stranded on this one?"

"Alien. Also known colloquially as an 'ET.'"

"Well then. That's it. 'Ask Alien.'"

"I do not think we wish to call attention to your . . . non-local origins."

Qtzl's feelings were hurt. "Well, then *you* suggest something."

Accordingly, Ship reviewed databases of common names beginning with the letter 'A' and came up with "Arlene." Close to "alien," but not close enough to draw suspicion.

Ship dispatched the packet to the newspaper and Qtzl began an expectant wait. While he waited, he returned to the transport module to assess the damage and began the painful process of learning the natives' difficult language. "All gutturals," he complained. "It's enough to give a person a sore throat."

By the end of another week, Qtzl had managed to read a book or two. It was challenging; even Ship was at a loss over certain words and concepts, and Qtzl began to suspect that he had stepped into a very strange world indeed, much like his favorite childhood story of Qalss in Tuiifooshand.

A decaday and a myriad résumés later, Qtzl had read a variety of books—mostly of a type called "science fiction." It was not without its

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counterpart on his own world—every people, he suspected, dreamed of other peoples on other worlds. He also learned how to play computer games and developed a taste for something called "cheese puffs," which was one thing his borrowed cupboards seemed to contain in abundance.

And then came the call. Not a call, precisely, for the only address Ship had left the newspaper was an electronic one. They wanted Qtzl—or rather, they wanted someone named—

"Arlen?"

"They apparently thought 'Arlene' was what they refer to as a 'typo.' I am not certain why they came to that conclusion. They want to know your last name and phone number. They wish to speak to you directly."

"I has anticipationed them," said Qtzl in what he imagined to be perfect American. "I has been studying them lingo."

Ship was silent for a moment, then said, "Perhaps I shall tell them you are away and will call them back in several days. I believe that should be enough time to remedy your lamentable lack of language skills."

Three days later Qtzl spoke to the newspaper's managing editor. He was nervous, most especially when the man asked, "Where're you from? Originally, I mean."

"Uh," ad-libbed Qtzl, "why do you ask?"

"Oh, your accent. I can't quite place it. French, is it?"

French. Qtzl glanced feverishly at Ship's remote self, stationed, as always, by the computer. The screen flashed to life and began to display information. *French: Native of an autonomous provincial unit called France which lies across a large body of salty water from these shores.*

"Ah, yes. Er, French, well . . ."

"No, wait . . . Canadian, isn't it?"

The computer screen cleared and displayed one word—"yes."

"How—how perceptive of you. Yes, indeed. I'm from, er . . ." He squinted at the screen. "Canada. Yes, um, Winnipeg to be exact."

"Of course! *Quebecois!* I should have guessed. That explains why your name doesn't sound quite *French*. 'Quet-*zell*'—am I pronouncing that right?"

"*Ket*-zell," Qtzl corrected him, eyes still on the computer. "It's, er, Belgian. I'm—ah—third-generation Canadian." He rolled his eyes. How would he ever keep all this straight?

"Why," he asked Ship later, "didn't we just say 'yes' to French?"

"Because then I would have been required to tutor you in the language. Teaching you American has consumed enough of my processing time."

Qtzl did not let Ship's cool derision deflate him. He had passed. He had pretended to be an Earth person—Human, they called themselves—and passed.

"Now," Ship continued, "we'll need a bank account in which your new employer can deposit your wages. We will also need a 'credit' account on which to charge your purchases. I shall take care of these details."

"And I," said Qtzl, "will bring home the *xuti*."

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In the next several days the letters arrived over the network to print neatly on the borrowed computer's output device. Qtzl was to select the ones he found most interesting (though his new employer did offer suggestions), answer them and send them back with replies attached. A simpler job, Qtzl could not have imagined. Despite his first impression, the humans were not nearly so alien as he had thought, although it was clear their society possessed its share of peculiarities.

Dear Arlen,

A while back, I sent my friend—I'll call her "Sue"—a chain letter. I've always thought of Sue as a good friend, but she broke the chain! In two months she has yet to send the letter to the people targeted by her list! I'm not superstitious or anything, so I'm not afraid I'll have bad luck because Sue broke the chain, but I'm really irked that she'd be so irresponsible. I don't know which makes me madder, her laziness or her lack of loyalty to me as a friend.*

*My sister says I should nag** her about this. Should I? My husband says I should break off our friendship before anything bad happens. What do you think?*

Steamed in Amarillo

Ship's memo: *Please see attached notes on the term "chain mail" or "chain letter." I construe from these materials that chain mail is associated both with extremes in fortune and with protection from harm—from ill fortune, one must assume. Evidently, sending the chain mail along to the "target" intact engages protective function, while severing the chain disables it, thus calling down a curse on the hapless recipient. **For your information, a "nag" is a colloquial term for a hoofed quadruped of doubtful quality, usually referred to as a "horse," scientific term, *equus.*

Dear Steamed,

It sounds as if chain mail is quite dangerous. I'm surprised it is legal. I am equally surprised that you would send such dangerous materials to someone you consider a close friend. You are obviously a foolhardy human being, and I think you owe your friend, Sue, an apology. On the other hand, she would seem to owe you some remuneration for the broken chain.

By the way, I think you should consider sending letters made of some less inimical material—I am told paper is a suitable medium.

I would also recommend against turning Sue into a horse. It sounds as if that process might be difficult to undo and would only compound your folly.

"Your employer called."

Qtzl looked up from the book he was reading—one of a series about the inhabitants of a planet named Mars which, if the story could be believed, was this planet's next orbit neighbor.

"And?"

"He likes the column. He referred to it as 'kitschy.'"

"What's that?"

"I am not certain. I could find no

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reference to it in the dictionaries at my disposal. It is most certainly positive. He also wishes to know if you wish to use the photograph we sent or mail him another. He indicates that a photo used for publication needs to be of a higher quality than the one we sent. He requires a scanned image of the original 'black and white glossy.'"

"What is an 'original black and white glossy'?"

"The photo we sent was evidently a second- or third-generation print. We need to find an original photograph."

"But I *liked* that one. I liked the way the person's fur grew all around its face. It looked almost the same upside down as it did right-side up."

"Mr. Barnett says he must have an original photograph either mailed or scanned and downloaded. I suggest we find such a photograph."

Qtzl searched. He searched the bookshelves, the desk drawers, the closets. When that failed to turn up any sort of 'black and white glossy,' he turned to a tall cabinet in a corner of the computer room. It was not a pleasant task; the cabinet was overflowing with sheets of cellulose, paper and semi-transparent flimsies all crammed into brightly colored covers of a thicker material. After sustaining a number of small, painful cuts to his digits, Qtzl found a red folder that bore the title "Cover Shots." This turned out to be just what he was looking for.

"Look!" he told Ship, holding the folder open for the Remote to see. "This is the most extraordinary bit of luck! Not only are there photos here, but they are very like the one of the human whose picture is on some of the books I've been reading."

Ship looked. "Qtzl, the photo in your left hand is the original of the picture we have already sent."

Qtzl held up one of the photos. "Are you sure? Perhaps it's merely ethnocentricity on our part. You know the old saying—'all aliens look alike.'"

"First, Qtzl, being a machine intelligence, I am not prone to ethnocentricity. Second, my optics are far more sensitive than your own. This is not only the same person, it is the identical photograph."

Qtzl was amazed. The Deity had favored him with yet another miracle. "Relief! I was wondering how we were to explain to Mr. Barnett that I now looked like someone else."

"I am given to understand," Ship said, "that inhabitants of this planet change their physical appearance quite liberally by surgical means. Moreover, some writers use photographs that do not accurately represent them to their readers. It is possible that this photograph does not portray this . . . Stanley Schell. Put the photograph on the desk, Qtzl, and allow me to digitize the image."

"Why didn't you let me take the call from Mr. Barnett?" Qtzl asked as the FRU glided to hover above the picture.

"You were sunning yourself on the roof."

"You could have called me in."

"No need. I was perfectly capable of handling the situation. I explained that I am your secretary, Fru Shipley. The photo is sent. Your first column will appear in the Sunday issue. Cred-

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its have already been deposited to your account. At the current rate of pay I estimate it will take approximately eight month's wages to purchase and process the materials necessary for my repair."

"Eight months!"

"We must also purchase provisions, Qtzl. You are not a hunter. Therefore, we will need to shop at the local food depository."

"And how are we supposed to do that? I've read *National Geographic*. I've seen 'Godzilla versus Gamera' and 'War of the Worlds'; I look like a giant lizard and you look like a miniature Martian."

"They deliver," said Ship. "Our first groceries will arrive this afternoon at exactly three hours, post meridian. I suggest we stay out of sight. Now, should you not return to reading your mail? A number of people are seeking your advice today."

Dear Arlen,

I feel a little funny writing to a column about this, but I don't have anyone else to turn to. After our annual New Year's Eve party my husband's sister and her husband were the last to leave. As we were saying our good-byes at the door, my brother-in-law (I'll call him Fred) slipped up behind me and goosed my buns**! I'm torn—should I tell my husband? Part of me wants to, but this little voice in my head insists it will ruin his relationship with Fred and hurt his sister very badly.*

Speechless in Tulsa

Ship's note: *A goose is a large aquatic fowl which makes a sound not unlike one of your sneezes and whose natural gait is a waddle. **Since Speechless is not explicit about what variety of buns to which the brother-in-law applied the goose, we can assume only that they were a baked foodstuff made of flour, milk, and eggs (perhaps goose eggs?).

Dear Speechless,

I think you should most certainly tell your husband about the incident. He may well wonder why there is goose down in his baked goods. Telling the truth may be embarrassing, but it will save you from having to fabricate a lie.

As to your brother-in-law—shame on him! I believe you should confront him and allow him to make restitution for his peculiar behavior. I would suggest the least he could do would be to bake your family some fresh buns!

By the way, I have been reading a lot about human psychology and it sounds to me as if you might have something called multiple personality disorder. Nothing to be alarmed about, I'm sure—in fact, it sounds as if it might be quite entertaining to have several personalities at your disposal—but I would recommend that you make an appointment to see a psychiatrist before the little voice in your head advises you to do something dangerous.

"The groceries have arrived."

Qtzl was slow to emerge from the Stan Schell novel he was engrossed in. He made a noncommittal noise in the back of his throat and turned the page.

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"Your taste in literature seems to have lodged in a rut," Ship observed. "Is that not another Stan Schell novel?"

"I like the way he deals with alien races. Quite enlightened for someone who's never met any."

"He is a science fiction writer," said Ship, as if that alone was supposed to deter Qtzl from reading his work. "That is an 'escapist literary form about unlikely characters from implausible futures thrown into impossible situations.'"

"Such as being stranded on an alien world?"

Ship persisted. "He is not considered to be one of the 'greats.' He is, I believe they say, firmly mid-list."

"And what do the 'greats' write about?"

"War, sex, death . . . bullfights."

"Ffsstt," said Qtzl, "I'll go get the groceries." He padded downstairs, the soft, orange material of the leggings he was wearing puddling comfortably around his feet. The delivery boy had left the box of groceries in its usual place under the back awning. All Qtzl had to do was lean out of the door and get it. He peered through the transparent sliding doors. He slid back the door, stepped out and picked up the box, pausing for just a moment to close his eyes and breathe in the sweet, tangy air.

He loved that smell. There wasn't anything on his world quite like it. Ship had determined that it originated from the sap of the trees that towered around the house. He had decided that when he left, a box of those spiky seed pods they dropped everywhere would come with him.

The snap of a twig and a chuff of sound brought Qtzl to sudden focus on the world around him. There, just beyond the deck where he stood, right up against the side of the house, a group of native life-forms stood and stared at him. Their black-lipped mouths were full of the flowering blooms that had appeared all around the alien domicile and though they seemed frozen with surprise, their jaws continued to move.

"Sh-sh-sh," hissed Qtzl, clutching the box in his quaking arms, his crest flat to his head. "Sh-sh-ship!"

It took an eternity for Ship to respond. Qtzl shook harder; his crest got flatter and turned purple; more blossoms disappeared into the black mouths of the life-forms. At last, the FRU's blessed hum could be heard behind him.

"Yes, Qtzl?"

"Are . . . are these carnivores?"

"No. Herbivores."

His crest relaxed. "Are they . . . people?"

"No, Qtzl. They are called 'deer.' A peculiar life-form variously celebrated and hated. My research indicates horticulturists hunt them because of their dietary cravings."

Crest merely quivering now, Qtzl took his box of groceries back into the house. He put the groceries away; the FRU returned to the computer room.

"By the way," it said when he appeared there a moment later and returned to his book, "they want to syndicate you."

Qtzl's crest flattened again. "They what?"

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"We have been approached by a national newspaper syndicate. They wish to purchase your column for distribution to all of their publications. This is a good thing, Qtzl. This will hasten my repair."

Qtzl glanced at the pile of letters he was scheduled to read that day. The one on top, like many others he received these days, was not asking for advice, but thanking him for advice already given. National syndication. "Will I be famous, Ship?"

"I believe so."

Qtzl wrinkled his nose and whistled softly through the flattened slits. How strange if he should gain on this alien world what had so far eluded him completely at home. His fondest dreams to the contrary, no one took his philosophical meanderings seriously, or read his poetry in *klatch* shops, or hummed his songs as they went about their business. Not even members of his immediate family would take his advice. "Life," he murmured, "is full of strange turns."

Kerwin Frees had narrowed his search to a small valley between two low ridges. It was rural—even for the Tahoe area—but he was hopeful that among the clusters of summer homes and isolated retreats someone had seen *something*.

He had mapped a course that took him on a rough circuit of the area, going door-to-door. Not many doors opened. This time of year, most of the summer homes were awaiting their occupants, while the ski lodges had just bid their owners good-bye. Of the few people he spoke to, only two had actually seen the blazing trail of light. One, out for a late-night walk, had seen it reflected in the water of a large pond; the other, an insomniac, had glimpsed it as it passed over a skylight. A handful more claimed to have been awakened by something—some noise or tremor or explosion—and had assumed it to be thunder or a stray jet.

Still, he was able to determine approximately where the "meteorite" had skimmed the treetops. It was pushing twilight when he pulled his car into a little cul-de-sac called Perelandra Circle—an ironic and downright un-Tahoe-ish name. There was one cabin in the cul-de-sac, though he could see the smoke from a neighboring house weaving among the trees.

As he pulled into the drive, he was startled by movement on the roof. He glanced up, but caught only a flash of turquoise above the ridgepole. If it was raccoons, they'd taken to dressing up for their nocturnal forays. There was no car in the drive, but a light was on inside. It was extinguished even as he approached the front door. He knocked, he rang, he knocked again. He tried to peer through a front window. Once he thought he saw movement in the darkened recesses of the place, but he couldn't be sure.

Probably a kid, he thought, or a woman, left alone and waiting for parent or partner to come back from the store. "Hey!" he called. "I just want to ask a couple of questions about a meteorite fall we had a while back. I'm a . . . an astronomy student and I was hoping I might find it. It'd really help

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my grades, you know?"

There was a long silence, then, a voice just on the other side of the front door said, "A meteorite?"

"Yes. It was May 6th. At about one A.M."

"And it fell near here?"

"Very near. Possibly in that little valley behind your house. Did you see it?"

"No. I'm sorry. I did not see it. I was . . . not up at that hour."

Kerwin Frees muzzled his frustration and asked, "Did you hear anything then? I talked to several people in the area who said they heard something that woke them up—like thunder or a jet going over."

Now the silence was profound. Then, Kerwin Frees imagined he heard murmuring on the opposite side of the door. "Do you think you might open the door? It's kind of hard to communicate like this. I'm really not dangerous."

"Sorry, I'm afraid I can't do that."

"I understand. So did you? Hear anything?"

"I heard nothing. We had not taken occupancy of the house just yet."

Frees frowned. "A minute ago, you said you were asleep. Now you say you weren't in the area?"

"We were, as you say, 'in the area.' We were not in the house at that time." There was a pause and some more murmurs. "We were camping . . . across the valley."

"You still might have heard something."

"We did not."

It was a strange interview, Kerwin Frees thought later, as he drove home in the dark. The hidden speaker (and a hidden companion, he was fairly certain), the sexless, oddly accented voice, the ambiguous answers. A very strange interview. He let his imagination run with it; he had stumbled across a hostage situation, or one side of a love triangle, or someone who had broken into the house and was using it without the owner's knowledge.

The more he thought about it, the more this last idea stuck with Kerwin Frees. He decided he would call the sheriff's department in the morning and suggest that the house might bear watching. Could just be kids using the place as a party spot, or it could be someone a lot more sinister. He wasn't prone to poking his nose into other folks' affairs, and he didn't feature himself as a good Samaritan, but he might be able to keep some poor schmuck from walking into a very sticky situation.

Stan Schell was tired. In fact, he was exhausted. It was day ten of a two-month book tour and he sat in a titanic Barnes & Noble in Sacramento wishing he was browsing for books instead of sitting behind his signing table praying the cluster of newcomers by the front door had come to see *him*. Still, he was grateful to be here; the other stops he'd made so far had been in small-town specialty stores that had barely enough room in them for the signing table, let alone the two or three people who might show up to have him sign a book.

Working on his second latté from a neighboring bistro, he caught himself wondering who had first noticed that

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books and espresso go together like bagels and cream cheese, and realized he was hopelessly bored. And depressed. And exposed. He was between two sale tables, in conspicuous view. He'd signed a few books—might even sign a few more—but mostly he'd sat under the flickering glances of browsers, trying not to read their thoughts. Sometimes people would stop, pick up a book and indulge in pleasantries, such as informing him that they didn't read science fiction in a tone of voice that suggested they didn't understand why anyone would.

At the bottom of the latté, he decided he'd had it with trying to look interested and interesting. He pulled a newspaper from his briefcase and pretended to be looking at the ad for his signing. Then he gave up all pretense and turned the page. An audible sigh escaped him—and went completely unnoticed by the flock of shoppers around the sale tables. The section he held—the section the promotions manager had given him because his ad was in it—was inhabited by gossip columns, allegedly witty and urbane commentaries, and advice to the lovelorn.

Stan glanced surreptitiously around. He seemed to have become such a fixture over the last two hours that people had ceased to notice him. He turned his eyes back to the paper. His mind was desperate for something to do. He read "Dear Abby." Then he read "Miss Manners." Then he turned the page and met himself face to face.

He was simultaneously nonplused and pleased. Evidently the paper had run an article on the hometown boy as well as the paid ad. His eyes brought into focus the two words that appeared next to his face on the page. *Ask Arlen*. His gaze dropped to the text below. *Dear Arlen,* it said, *I feel funny writing to a column about this. . . .*

"Excuse me, but could you sign my books, please?"

"Huh?" Mouth still hanging open, eyes possibly bugged out, Stan looked up into the face of a fan. She smiled shyly and proffered two of his novels for him to sign—a paperback and the hardback that would go out of print in a month, barring divine intervention. He dropped the mystery back into the briefcase and scrambled for his pen. "That's what I'm here for," he said and smiled.

The girl cocked her head and looked at him as he imagined Alice must have once looked at the White Rabbit. "You're the guy that writes that advice column, aren't you? *Ask Arlen?*"

He stared blankly at the flyleaf of the hardback, once again meeting his own black and white gaze. "Looks that way," he said and signed his name.

When he visited the offices of The Bee, Ted Barnett's face lit up in recognition. "Well, if it isn't my star columnist."

"No," said Stan, "it's not," and proceeded to confuse the hell out of him.

At the end of an hour interview he knew that Ted Barnett did not read science fiction and that his star columnist was punctual, easygoing, undemanding, and transacted all business over the Net. He'd never missed a

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deadline. He had a unique slant on life (something Stan had already gleaned from a perusal of the column), and was from Quebec.

Stan also knew the columnist's e-mail address. He hadn't needed to write it down because it was his own—the local in-box of his summer house in South Shore Tahoe. It rather looked as if he was going to have to take a trip upstate. He did not request that his photo be removed from the column, nor did he, to Barnett's obvious relief, insist that the columnist cease and desist. He could not have said why he did not do those things, although he suspected unhealthy curiosity and a fascination with the bizarre (which had contributed to his delinquency as a writer) were somehow involved.

"It seems," said Ship, "that our descent did not go unnoticed."

"Should we be concerned?" asked Qtzl around a mouthful of cheese puffs. "The human thought we were a natural occurrence."

"One he is particularly interested in. If he locates the exact earthfall of this 'occurrence,' he will find . . . me. He is already very close."

Qtzl's crest pulled itself tightly against his head. He felt a strong urge to hiss. "What can we do?"

"Very little, Qtzl. We cannot move me."

"You're well camouflaged."

"To your eyes perhaps. Who knows how well camouflaged a human will find me?"

Kerwin Frees was not a wealthy man by any stretch of even an impoverished imagination. He kept a bit in savings for the all too frequent rainy day and had a few investments. He lived frugally on a teacher's salary during the school season so he could afford to chase UFOs the rest of the year. Now he dipped into savings to do something that would most assuredly cause his parents—happily far away in San Francisco—to throw up their practical hands in despair. He rented a helicopter to fly over the eighty or so acres he'd targeted as the most likely place for the UFO to have come to Earth. To make the sort of showy splash it had in the midnight sky, it would have to have been of a size that couldn't fail to disturb even the densest forest.

He started the pilot at one end of the target valley and asked him to take a zigzag course down the length of it, flying as low as was safe, practical and legal.

The pilot, for his part, was close-mouthed and taciturn, not even asking his client what they were doing until they were making their third dogleg over the forested slopes, Frees peering intensely into the greenery below, camera clutched in his hands. "Exactly what is it we're looking for?"

"I'm not sure . . . exactly." That was the truth. Did he keep his eyes peeled for a flash of sunlight on metal? For a burnt swathe of forest? For a few flattened trees? Yes, all of the above. "Something unusual."

"Unusual as in what . . . Sasquatch?"

"What? Oh. Oh, no. Nothing like that. I'm a-an astronomy buff. I think a meteorite fell out here a while back.

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It'd be great if I could find it."

"Wouldn't that have been on the news?"

"It was."

"Huh. Missed it, I guess. Not that I pay much attention to things like that. Ball lightning—now *that's* something I'm interested in." The pilot, suddenly garrulous, proceeded to regale him with a series of ball lightning stories, and Frees, guiltily interested, listened to them.

Somewhere in the middle of the third or fourth tale—one in which the pilot suspected the lightning of owning some form of primordial intelligence, Frees suddenly lost the thread of narration. His eyes had found something unusual: flattened treetops pointed as eloquently as any arrow to a long scar in the bare earth to their east. The scar ended in a dense thicket of brush. He took a flurry of photographs.

"What?" asked the pilot. "What is it? You see something?"

"Something. Could you get us closer to that . . . that scar in the ground down there. There—just beyond those broken trees."

The pilot whistled. "See what you mean." He heeled the 'copter over and headed back around for a second, lower pass.

"I don't suppose," said Frees, snapping madly away with his old Pentax, "that you could land us down there?"

"No-o-o way. Nobody could land down there. Except maybe your meteorite."

Frees nodded and glanced around the area for landmarks. He found one of particular interest—the cabin on Perelandra Circle, which was, he calculated, mere hundreds of yards from the crash site. If there were people in that house, they couldn't have avoided seeing the off-world visitor plummet to Earth.

The house did not look particularly lived-in. There were no vehicles around it. No smoke curled out of the chimney, though the air was beginning to cool slightly with the onset of evening. Stan contemplated his approach. He could sit here until his eyes froze open, feeling like a poor man's Spenser, or he could get up and boldly go where nobody else had any right being.

He did not know martial arts. He did not carry a gun, mace, or pepper spray. He was, he had to admit, a poor excuse for a red-blooded American homeowner. Despite these drawbacks, he started up his car, pulled off the shoulder of the badly paved road, and drove brazenly into his driveway. No one ran out shooting. He heard no slamming of windows or doors.

He hesitated momentarily, then got out of the car, patting his pocket to make sure his cell-phone was still there. At the first sign of trouble, he would call the police. He should have called them before, he supposed, but he wasn't sure what he might have said that would have made sense: "I think someone pretending to be me is writing an advice column out of my summer cabin." Oh, yeah—that sounded believable.

He slammed the door of his car, then opened it and slammed it a second time. Then he approached the

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house, while having a loud conversation with himself. The front door was unlocked. He hesitated again, thought about the police again, then opened the door. "Hello?" he called. Silence. "Halloooo!"

The place was clean—had even been dusted—though the cleaning service wasn't due to go over the place for several weeks. He made his way through the living room toward his office where he would surely find evidence of habitation. On the way, he peeked into the bedroom. The bed looked untouched. If there was someone sleeping in it, they were scrupulously neat.

In the door of his office he stopped cold. This was obviously the center of the interloper's activities. The computer was turned on and apparently downloading something. Even as he watched, it finished up and returned to the main e-mail window. Curious, he opened the message icon that had appeared at the end of the download.

"Here's your new batch of goodies, Arlen. There're some real doozies in here," said the message, and was signed, "Alec." Probably an editorial assistant. Still more curious, Stan opened the download and read:

Dear Arlen,

I was lunching the other day with an important client, when suddenly, in the middle of the meal, she got out a mirror and a dental pick and began cleaning her teeth right there at the table! *I almost came unglued. Try to imagine a sophisticated-looking woman in a Christian Dior suit sitting in a five-star restaurant giving herself a root-planing!*

I am in a complete dither—this woman represents our most important account, but now I'm afraid to be seen with her for fear I'll find out she's got some other private chores she likes to do in public. I find it hard to believe she's never been thrown out of a restaurant for this. What should I do?

Stymied on Staten Island

Fascinating. It really *was* a doozy. In a sudden fit of unnameable urges, Stan sat at the keyboard, opened a word processor file, and wrote:

Dear Stymied,

Since you're eating in five-star restaurants, I must assume you have a little cash to throw around. Next time you're out to lunch with your client, slip the maitre d' *a twenty and ask him to toss the woman out on her ear at the first sign of dental hygiene. Alternatively, you might consider stationing a couple of friends at a nearby table with instructions to squeal "E-ee-w! Gross!" the moment she goes for the floss.*

He was absurdly pleased with the response. *Pity*, he thought. Doing an advice column could be a kick. That did not answer the question of how someone else had come to be writing an advice column in his name . . . or rather, his face.

He was on the verge of searching the room in answer to that question when he heard the back door open and close. A peculiar humming tickled his ears. Hair rising all over his body (his chin felt as if it were in contact with a hedgehog), Stan slipped

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from the chair into the closet four feet behind it. Once there, he tried to peer through the louvers but found he couldn't see a thing. He settled for listening.

What he heard was a bizarre series of clicks, whistles, hums, chirps and hoots that were answered by a similar barrage of sounds. He thought he could almost make out words, but couldn't imagine what language he was listening to. It sounded made-up, but then, the only made-up languages Stan had ever heard were Esperanto and Klingon, so he hardly counted himself as an expert on the subject.

The sounds became suddenly more forceful and then, Stan heard his answer to the letter read back in strangely accented English. The reading was followed by a particularly loud hoot. "This misses the point entirely! For someone to display her teeth so prominently in a public place—well, it's a miracle a fight didn't break out. How irresponsible!"

"Ketzel, I believe it is *you* who is missing the point," said a second voice in perfectly unaccented English.

"How so? Clearly—" (Stan could hear the manic depressing of keys on his keyboard.) "Clearly, to suggest this action is merely rude is to minimize—"

"Ketzel, who entered that reply? This file is freshly downloaded."

There was a pregnant pause.

"More to the point," continued the unaccented voice, "*Where* is the person who entered that reply? We were not gone above five minutes."

There was a flurry of movement. One of them had left the room. Stan all but held his breath. A few moments later, the flurry was repeated in reverse.

"There is a ground vehicle before the house! Someone *was* here."

"Excellent logic, Ketzel. Although, I should say the vehicle's presence suggests someone is *still* here."

"Would you, er, scan, please?"

There was a muted twittering sound and Stan's hair saluted again. Instinct drove him to the floor of the closet to hide in a jumble of ski jackets, bleacher blankets and two large teddy bears he had purchased, but had never given to his niece. It was from this motley refuge that he saw the closet door swing open and peered up into the face of a giant, frilled lizard. Hovering near its shoulder was a sleek, silvery object that bore an uncomfortable resemblance to the probes used by Martians in the movie "War of the Worlds." The lizard's monstrous orange eyes swept the closet, coming to rest on the assorted debris on the floor.

Stan, numbed to speechlessness, prepared to surrender. The lizard's mouth opened and perfectly intelligible English words came out.

"I don't see anyone."

"Ketzel," said the sleek, silver probe, "observe." A gleaming tendril issued from the probe and aimed itself at the tip of Stan's nose.

The lizard's eyes focused. "Oh," it said.

"E-ee-ee-ee!" said Stan, and fainted.

"It's him. There are some differences between the 3D and the 2D, but it's him."

"I would have to agree. I suppose it

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was remiss of me not to suspect he would have to return to this domicile at some point. It is nearing the time of year when many of the inhabitants of this particular society go on vacation."

"Vacation?"

"Similar to what you were doing when we became . . . lost."

Stan assumed he was dreaming. The only viable alternative was that, sometime in the recent past, a short-order cook in Tahoe City had hidden his stash of recreational drugs in a jar of chili powder.

"He poses a singular problem. What do we do with him until we can leave?"

Do with him?

"We don't have anywhere near the resources we need to leave . . . do we?"

"No, we do not. The engine refit is nearly complete, but the long-range navigational array is still a shambles, and the port gimbals suffered severe damage when we skidded sideways among the rocks. Really, Ketzel, we are fortunate there is anything left of the forward steering mechanism at all."

Stan was dismayed to realize he was listening to a real conversation taking place somewhere behind him. He opened his eyes. He was stretched out on the sofa in his office staring into the glass panels of the tambour door of a bookshelf. Reflected clearly in the panels was one helluva tall reptile and the sleek little probe Stan had seen in an earlier psychotic episode. He closed his eyes then opened them again. The reflections were still there.

Abandon logic, all ye who enter here, Stan told himself, and studied his uninvited guests as they continued to ponder his fate.

"Perhaps if we just keep him here, quietly, no one will notice."

The lizard was probably not really a reptile, Stan thought, but merely looked like one. Maybe he was some sort of intelligent dinosaur—the kind Bob Bakker would just love to find on his front porch some cool summer evening. *Hello, I'm homeothermic.* It did resemble the dilophosaurs from *Jurassic Park*, the Movie . . . except, of course, that it was wearing his sister Genevieve's fuchsia sun-dress. Absurdity rose in his throat, nearly choking him.

"Someone may notice the vehicle before the house," said the Martian probe. "And it is probable that someone will mark his absence. He may well have informed someone else of his intention to come here."

"I did." Stan sat up and turned to look at his . . . whatever. "I told my agent, my editor and several close friends that I was coming to Tahoe to see who's been using my address—and my face—to publish an advice column."

There was a heavy silence, then the dilophosaur shuffled to face him. "Hello," it said and its rubbery mouth curled into an approximation of a smile. "I'm Qtzl." It glanced sideways at the probe floating silently beside it. "I'm from—well, very far away—and I'm lost and I need to get home again."

"And you left your ruby slippers at home, right?" *Good response if this is a hoax. Please let it be a hoax.*

The reptilian head canted sideways. "Excuse me?"

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"He makes a reference," said the probe, "to a popular movie—*ixltl*, to you—in which the lost heroine gets home through the agency of a pair of ruby slippers she has inherited from a deceased crone. Yes, Mr. Schell, that is essentially correct. We have crash-landed on your world and our only means of getting home is damaged, though not beyond repair. We have hopes of earning enough capital to purchase all the materials necessary to restore it."

Stan blinked. "You're kidding. Look, this is a joke, right?"

The probe floated over to the sofa, pausing to hover right before Stan's startled eyes. "You suspect a hoax, and this is understandable. Please notice that I am not suspended by any wires or strings."

Stan waved a trembling hand around the probe. It was as good as its word. "OK. I see that."

"Ship," said the lizard. "Show him where you crash-landed. That will prove we're not a hoax, won't it?"

It was a spaceship. By God, it was a *spaceship!* Kerwin Frees's hands shook as he let the foliage fall back into place. He took a step back from the mound of uprooted shrubbery. It had crash-landed here and had been carefully concealed. And there were signs that it was under repair.

By whom?

He glanced up the hill toward the little cabin on Perelandra Circle. By someone in that house?

He turned back to the ship, his camera bouncing against his chest. Evidence. That was what he needed. He pulled a couple of handsful of greenery away from the vessel and began shooting. He was between shots, looking for a different vantage point, when he heard someone approaching from uphill.

As often as he had allowed himself to imagine an encounter of the third kind, as often as he had invented his response, he had never imagined he might panic. But he did. He stumbled to the bow of the ship and threw himself into a ramble of underbrush, just barely able to twist into a position from which he could see the stern before he was forced to freeze.

A man appeared first—a bearded man in a forest-green shirt and jeans. Frees had no time to be disappointed before "it" came into view—a reptilian alien life-form in bright fuchsia. It was a sundress, he realized, a woman's sundress. That fact had barely registered when he noticed the sleek metallic object floating between the two other figures.

The reptile, speaking, began pulling camouflage away from the vessel. Words floated back to Frees's ears—*English* words. "See? . . . This . . . Ship . . . Believe us?"

Another voice spoke. The reptile's mouth wasn't moving, nor was the man's. It must be coming from the floating "droid" which bobbed about the stern. A moment later, it began moving forward toward Frees's hiding place. His throat felt as if a peach pit was stuck in it.

"As you can see," the floater intoned in perfect English, "the bow planes have suffered the most damage. We are currently attempting to

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procure the materials necessary to repair them."

"Will you really be able to do that?" asked the human, and Frees's eyes were drawn to his face. It was a familiar face. He was certain that if his brain wasn't caught in some insidious form of paralysis, he'd be able to put a name to it.

"Ship is fully capable of self-repair," said the reptile. "We need only the materials. That's why we . . . availed ourselves of your cabin."

The man was nodding. "And my face." He sighed. "OK. I believe you. Good God, do I have any choice?" He turned to look at the reptile. "How can I help?"

The reptile's mouth widened, not quite showing an amazing set of teeth. "Don't show the whistle on us, please."

"*Blow* the whistle," said the droid.

"Whatever. Please don't do it. Let us continue with our ruse. We'll be out of your chair soon, I promise."

"Out of your *hair*," said the droid.

"Whatever. We'll be out of it. What do you say?"

The man glanced back and forth between the two aliens. "Can I see inside the ship?"

Kerwin Frees was gasping by the time he made it back up to the road. He was closer to the house than he'd meant to be, but the aliens and their human cohort were still downhill in the ship. He started to turn toward where his car was concealed, but caught sight of the vehicle sitting in the driveway of the cabin. He hesitated only a moment before hurrying to investigate it. It was a small Japanese sedan, fairly new. He slipped in through the passenger door and went speedily through the glove box in search of—ah—registration.

Stan Schell. Now he knew where he'd seen the guy before—on the back cover of several science fiction novels in his massive collection . . . and in a number of widely separated newspapers. Science fiction writer and advice columnist, what a combination.

The revelation gave him pause. He glanced around the property. No other vehicles—no camera crews. Nobody. OK, not a movie, then. Could it be a hoax? A publicity stunt of some sort?

He had no way of knowing, but he had ways of finding out.

The ship was real. At least insofar as Stan could tell. Not that he had much experience with these things except on paper, but the craft was not a Roswell Special—there wasn't an ounce of tinfoil in it, nor one stick of balsa wood. It was made of metal and something that was like plastic or fiberglass. It was big, too—nearly as big as a semi—and complicated-looking.

Inside, they showed him which systems were working, pointed out where repairs needed to be made, let him sit at the controls. He kept trying to be skeptical, to pass it all off as an elaborate hoax, but he doubted anybody but Steven Spielberg could create a hoax anywhere near this elaborate. As far as he knew, Steven Spielberg had no reason to be playing jokes on a little-known science fiction writer.

He found another reason to disbelieve the hoax angle—Ted Barnett had

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assured him that the advice column with his face on it had been appearing and gathering loyal readers for months. It had evidently become a household word in homes where no Stan Schell novel had ever been read. Meanwhile Stan (I-don't-read-that-section) Schell had gone unawares—where was the hoax in that? Maybe it was a conspiracy intended to see how long it would take a writer to discover his identity was being plagiarized. Maybe it was a test case to see if an identity *could* be plagiarized. Maybe . . .

Maybe these were aliens.

"Pardon?"

The lizard was looking at him through its gigantic orange eyes, its hands (or whatever) folded before its chest in a prayerful gesture. In his sister's sundress. His laughter, already uncontrollable, segued into a fit of hiccups.

"Ship! There's something wrong with Stan Schell!"

Oh, there certainly was. Either he was going not-so-quietly mad, or he was receiving the most extravagant gift the Universe could offer a writer of science fiction.

"He is laughing," said the probe. "And he is experiencing something called hiccups. Not a life-threatening situation. There are several suggested cures—we might try startling him."

The lizard was silent for a moment then said, "I believe we already have."

Back at the house, Stan and the aliens had tea and cheese puffs. Then, "Arlen" composed answers to his letters. He kept the answer Stan had made to the first of these—out of respect, he said, for their host.

Oddly, Stan wanted nothing more than to sleep. Overwhelmed, he supposed, and he surprised himself by actually being *able* to sleep. He curled up on his bed and slumbered deeply until his cell-phone woke him.

It was his agent.

"Well?" he said "Did you find anything?"

Only two aliens and a wrecked space shuttle. Nothing to get excited about. "Yeah. Someone's been using the cottage as a . . . base of operations. It's not . . . quite what I thought it was, though. Look, I'll have to explain it to you later. It's . . . complicated."

"Well, so's this. I just got a call from *The Tonight Show*."

"The . . . you're kidding. I thought they weren't interested in me."

"They aren't. They're interested in 'Arlen.' A Mr. Barnett let them in on the connection between the column and Stan Schell and suddenly you're famous—SF writer moonlights as adviser of the lovelorn. They want you to come on and read some of the letters you've gotten—and, of course, the 'charmingly oddball' answers."

"But *I* don't *have* any answers!"

"And they want you to field questions from the audience and just generally, um, be Arlen for them."

"But I'm *not* Arlen! I'm Stan Schell! I write science fiction. I'll talk to them about that all night, if they want."

"That's just it, Stan—they don't want. Maybe we should just turn your trespassers over to them."

For a moment Stan contemplated that—going onto *The Tonight Show* and telling them all about today. Maybe

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even showing pictures. There was a camera in the front hall closet. As soon as he had the thought, he discarded it. Doing that would result in one of several horrific scenarios: (1) No one would believe him; he would be labeled a crackpot; and his career would come to an abrupt halt. (2) No one would believe him but a legion of UFO chasers; he would become a poster child for "abductees" and hit the talk show circuit while his writing languished. (3) Everyone would believe him, including the government; he would end up in a witness protection program or, worse, he and the aliens would become "guests" of the US government.

"Look, just tell them I don't want to do it."

"Are you nuts? This could be—"

"Excruciatingly embarrassing, that's what it could be. I'm a science fiction writer, dammit. A good one. Just keep getting me gigs as a science fiction writer."

"There aren't that many gigs for science fiction writers, Stan. At least not ones at your level. This could get you exposure."

"Exposure? I'd rather run naked through Central Park."

"Think about it, OK?"

"Yeah, right."

"What is *The Tonight Show*?" the lizard asked the moment Stan poked his head tentatively into the office.

"Wh-why do you ask?"

"I have gotten an e-mail about it. I have been asked to appear on this *The Tonight Show* to discuss the column and 'share some excerpts,' but I have no idea what this means."

Explain a nighttime variety show to an alien. Interesting assignment. Stan supposed he could *mis*-explain it, but he knew that the FRU would be able to disabuse Qtzl of any false impressions. He explained as best he could, and was surprised at Qtzl's immediate comprehension.

"Yes, yes! We have this at home, too. People speak and sing and dance and show their prowess at game or thought. Yes, I know this. But at home, these . . . shows are broadcast widely. Many thousands of people can experience them. Is it so here?"

Stan nodded. "*The Tonight Show* is probably the most exposure a person can get in one hour. It's been known to make or break careers."

Qtzl's neck frill, which had risen to the occasion, sank back to his shoulders. "But, Stan, I cannot appear on your show. If I do, everyone will see me. Then what would happen?"

Stan had no answer to that. In his books, aliens were feared, loathed, embraced wholeheartedly, worshipped. He realized he had no idea how real human beings would react to real aliens. "I don't know," he admitted.

"Could *you* do the show?"

"How could *I* do it? I don't write the column."

"Well, you did write one reply. It was perhaps not as well thought out as it could have been—you missed a few issues. . . . But that doesn't matter, I could coach you. I could be in contact with you all the time you were on the show. I could put my words in your mouth."

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"How?"

The FRU chose that moment to float silently into the room.

"That's how," said Qtzl.

"Damn," said Stan.

"OK, OK, OK," said the young man in the third row. "I got one for you. There's this girl in the group I hang with who's real cute, but has this really disgusting habit, OK? Whenever we do fast food, she orders a hot dog, OK? And she takes a bite out of one end and then—this is gross—she turns the hot dog around so that *I'm* staring right at the bite and takes a bite off the *other* end. What can I do about that?"

"Not sit across from her?" Stan suggested. The audience laughed and Stan felt a warm glow spread across his cheeks. *Cool.*

In his ear, Ship chirped in annoyance. "Please, Stan, let Qtzl take care of this."

"But seriously," said Stan and paused to field Qtzl's thoughts. "Are you really as dense as you sound? Don't you recognize a mating ritual when you see one? This . . . female . . . is obviously attracted to you and is inviting you to partake of the Food Ritual with her. Your response, young man, should be to lean across the table and take a nice, big bite out of the proffered end of the food item. Unless, of course, you do not find the female attractive. Do you find the female attractive?"

"Well, yeah . . ."

"Then you simply must bite the dog, young man. The only other response possible is to get up and leave the eating area. But this would leave the female with the impression that you don't like her and don't wish to share her food."

The audience loved it. Every off-the-wall second of it. A week later, Ship's port bow gimbals were on their way to recovery and "Arlen" had been asked to appear on *The Late Night Show.*

Kerwin Frees stared at the row of photographs bobbing festively from a line hung across his tiny kitchen/darkroom and flogged his brain through a tangle of seemingly unconnected facts. *Fact 1*: An alien spaceship had crash-landed in the Sierra Nevada. The evidence of that hung right before his eyes. *Fact 2*: The aliens were staying in Stan Schell's Tahoe summer cabin. *Fact 3*: Stan Schell *knew* the aliens were using his house. (Witness the series of photos, taken yesterday through Schell's front window, of human and reptilian alien sharing cheese puffs in front of the TV.)

Then there was the *Ask Arlen* angle, which Frees had learned of while trying to glean information about Schell from his newspaper editor. It severely complicated the scenario, which as near as he could tell went something like this: An alien ship crashes. Shortly thereafter, *Ask Arlen*, a demonstrably weird advice column, appears in a Sacramento newspaper. Shortly after that, it goes into syndication. About this time, Stan Schell appears in Ted Barnett's office asking after the author of the column that bears his picture. He reveals that the e-mail address to which Barnett delivers his reader's letters is his own.

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Schell goes to Tahoe, purportedly to confront the face-stealing columnist. He discovers, instead, that there are aliens hiding in his summer cabin—something Frees had to assume was what he'd witnessed upon his discovery of the crash site. Schell immediately calls Barnett and "confesses" that he is the source of the column after all.

OK. What did that mean? That Stan Schell was fronting for aliens who came to Earth to write advice columns for human beings? Were we that pathetic, or was this some sort of very peculiar plan for world domination? And what was Kerwin Frees supposed to do with the information? He had been sitting on it for nearly a month, pretending to be gathering information, all the while wallowing in this insipid state of confusion.

He shook his head. Having achieved the dream of every UFO chaser the world around, he had no idea what to do next. The police were out. They wouldn't believe him. His UFO-chasing buddies were also out. While he used them as sources of information (all of which he took with liberal amounts of salt), he wasn't sure what they'd do with a real, honest-to-God alien. He realized he was afraid to find out.

Yet, the aliens would not be here forever. When their vessel was repaired, they would be gone, and he would have missed the opportunity of a lifetime. His options seemed to have dwindled to one. He moved to his computer, opened his e-mail exchange and carefully composed a message.

Stan Schell was writing up a storm. Whatever else this experience provided, he knew it would end up on the shelves of bookstores everywhere. Better still, it would leave the stores and find its way into homes nationwide. He had no doubt some people would actually *read* it. Since his face had appeared in newspapers countrywide and on TV screens, Stan's modest sales had become decidedly *immodest.* His book covers were being redone—Stan "Ask Arlen" Schell, they would say. The only person who had any reason to know he had not always been Arlen had a vested interest in keeping the column alive.

To the first talk show host who speculated as to why a science fiction writer would write a wacky syndicated column for the socially troubled under a pseudonym, he owed the widely bruited tale that he had been afraid people wouldn't accept advice from a writer of fantastic fiction. He had nodded amiably, too, when that same host suggested his mindset was a little bizarre. "A little alien?" he'd asked when the host seemed to be searching for a word. The audience chuckled. He loved that sound.

"Do you think anyone really takes your advice?" last night's host had asked him.

Dear God, I hope not, he'd thought, opened his mouth and parroted Qtzl's "Well, I should hope so. I mean, look at the (*twullip*, said Qtzl) . . . uh, crap these other columnists dish out. To take their advice is to perpetuate undesirable behavior by failing to respond to it in an appropriate manner."

"Like neglecting to take a bite out

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of your girlfriend's hot dog."

The audience tittered.

Stan flushed, simultaneously embarrassed and pleased. "Exactly. How many nascent relationships have been throttled by such inattention to ritual?"

The tittering escalated.

"We should commission a study," said the host and cut away to a commercial on laughter and applause.

Clearly, people didn't know how to take Stan or his alter-ego. Was he a con man—a clever writer with his own money-making shtick, or was he a sort of a rain man, a walking malapropism, a social misfit who had somehow parlayed his cockeyed world view into celebrity? He was fairly certain no one had arrived at the truth—that he was a struggling writer being fed lines by an alien.

Interviewers hovered between the smugness of a shared joke and the credulity born of uncertainty. Some were afraid to poke fun at him for fear, his agent told him, that he'd reveal himself to be a sufferer of Asperger's Syndrome or some other condition it would be socially indefensible to joke about. It hardly mattered. Qtzl didn't seem to understand when he was being made fun of and Stan, though sometimes on the verge of bolting from stage or studio, would simply deliver his prompter's solemn responses into whatever situation he found himself. The result was always laughter, which translated into book sales, fame, and fortune.

The fact that his books tended to be rather serious in tone only added to the mystery. There was nothing of Arlen in Stan's novels (which were now *all* back in print and selling briskly, thank you), which led to his emergence as a character of great complexity.

Then the fact of his electronic link to an offstage source came to light. "Legal counsel," he'd told the host of a much-watched daytime talk show. "I have to be very careful what I reveal about the people whose letters I've responded to. If I were to give away their location—even the town they live in—or their real names, which they sometimes confide in me . . . well . . ."

The explanation had not been acceptable to everyone. Before long it was being trumpeted by the tabloids that there was a man (or woman) behind the scenes. Someone was giving Stan Schell his cues. Speculation blossomed, naturally, and gave birth to a ludicrous array of ideas, the dominant ones being that (1) he was fronting for someone who was equal parts rain man and elephant man—a tragic, fragile soul who did not dare appear; and (2) his offstage prompter was a person of such fame and fortune that to reveal themselves would bring unwanted attention, even ruin. Candidates for this included the Queen of England, the President of the United States, a terminally dignified news anchor, and an ultra-right-wing radio personality with MPD.

All this spawned something Stan had always thought was an oxymoron—unwanted attention. Six months after he had first appeared on the *Tonight Show*, mentally humming "This Could Be the Start of Something Big," he was beginning to whine

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about his "lack of privacy and personal control." He'd heard any number of Hollywood celebrities make that plaint and had thought them unrealistic weenies. Deeply immersed in his personal drama, his own weeniness escaped him.

One afternoon, Stan Schell took control of his life in the only way he could. He shaved off his beard, leaving only a professorial goatee. He was congratulating himself and patting his face dry when the FRU shuttled into the bathroom behind him.

"Stan," it said, "we have a problem."

"Out of cheese puffs?"

"No, Stan. This is rather more serious."

He turned to look at the FRU, vaguely disturbed, as always, that no expression could be read in the gleaming manta shell. "Not the Ship."

"Someone has advanced the idea that you are a front for an alien presence on Earth."

The only response that seemed appropriate was laughter. When he had gotten his hilarity under control, he asked, "Who'd believe such a ridiculous story? The person who made that up?"

"But, Stan, he did not make it up, as you well know."

"He?" Stan felt his pulse leap. "He who?"

Ship proceeded to tell him about the college student who had appeared one evening trying to get information about the crash of a meteorite. "I have no doubt what he actually witnessed was our landfall."

Stan shook his head. "Ship, think about it. Who's going to believe a whacko tale like that?"

"Tabloids, Stan. UFO chasers. There is more. We have received a threatening e-mail. This person has said he will expose the location of this cabin to tabloid reporters if you do not—as he put it—come clean."

"I can't 'come clean,' Ship. Not without giving you and Qtzl up to . . ." He realized he had no idea what he'd be giving them up to. "How soon can you leave?"

"I estimate three more days of constant work on my part."

"Did this guy leave a return address?"

"Yes."

"Then we'll have to try to stall him. I'll . . . invite him up here—Thursday. That will give you your three days."

Ship hovered silently for a moment. "What will you do, Stan Schell, when we are gone?"

"Me? I don't know. Retire. Try to make it on science fiction alone. I can't continue to be Arlen."

"Why not?" asked Ship.

"I don't think the way he does. I'm not alien."

"In your books you purport to write from the alien's point of view. Is that not what writing science fiction is all about—being able to put oneself in an alien setting of some sort? To be able to report what one sees through alien eyes? You once claimed you were a 'damn good science fiction writer.' How can that be if your imagination fails to let you be alien?"

Damn. Outargued by a machine. An alien machine. Stan wandered into the library and pulled one of his

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books from the shelf. *Stepping Over Shadows,* the cover said—a story of aliens transported against their will to a strange new world called Earth. He perched on the corner of his desk and read the passage describing the alien protagonist's first encounter with human beings. He skipped pages and read a paragraph or two about the alien's voyage aboard the Earth ship. It was good, he thought. He *had* captured the alien's sense of human alienness. And that had been written long before he'd met a real alien.

His computer screen still displayed the threatening e-mail. He read it, then sat down and sent a message to Kerfrees@shore.net. Then he called Ted Barnett at The Bee.

Kerwin Frees's heart turned over in his chest as he read the e-mail. He was going to meet the aliens. He sat back in his disreputable overstuffed chair and stared at the pine knots in his ceiling.

Stan Schell's message had posed one particularly disturbing question. "What do you want?" What *did* he want? Fame, fortune, notoriety? Or did he just want to be right? Did he just want to *know* that there was life Elsewhere—intelligent life, life we could shake hands with, communicate with, grow to like, even befriend as Stan Schell (damn him/bless him) had befriended his alien refugees. In three days he would know (hell, he already knew) that he was right. The question in his mind was—did he need the whole damn world to know he was right?

Stan heard the back door open and close. Qtzl came in, wearing a bright yellow sundress with orange tulips on it.

"I have come to say good-bye, Stan," the alien said, and Stan read honest emotion in the odd eyes. "Ship has run a diagnostic and says we are able to leave here. I can return to my family—my world." He paused and tilted his head from side to side several times as if he might shake the appropriate words loose. "I will miss having fame and fortune. It was something I never could achieve on my world."

"I know what you mean."

"Yes. I suppose you do."

"But just imagine, Qtzl, what will happen when you return after all this time and tell everyone where you've been, and how you had to brave alien danger to get home? You'll be a celebrity then, I'll bet. Everyone will want to know your story. Everyone."

"If they believe me. I have been known to . . . exaggerate."

"You have Ship. Would Ship lie?"

The reptilian face brightened. "No machine intelligence has ever been known to even exaggerate, much less lie. But . . . may I take some Earth artifacts back with me anyway—a set of your novels, perhaps?"

Stan nodded, feeling a lump begin to grow in his throat.

"And this garment." He fingered the hem of the sun-dress which came to just above his oddly jointed knees. "May I take this, too?"

"Sure. Sis won't miss it. Take those pine cones you've been hoarding, too, won't you? I sure don't know what to do with them."

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Qtzl's crest bounced up and down in pleasure. "Thanks, Stan. And now I must go. Ship is requesting my presence."

Stan checked his watch. "Yeah. Frees will be here any minute. You'd better get going."

They paused long enough for Stan to take a photograph of Qtzl in the yellow sun-dress. It seemed the appropriate way to remember him. Then the big lizard went to where Ship lay completely right side up on its landing struts, there to load his pine cones, books, and other Earth artifacts.

Stan waited. Not long. Kerwin Frees showed up punctually at his front door.

"Where are they?" He'd barely stepped across the threshold when the words were out of his mouth.

"They're leaving."

"They're—? You conned me!"

"You didn't leave me much choice. I couldn't expose them."

Frees gave him a panicked glare and bolted out the back of the cabin. Stan followed him down the hill to where Ship was overseeing Qtzl's clearing away of the last bit of brush. It looked somewhat the worse for wear, its once gleaming sides burnt and battered looking. But it had assured Stan it was serviceably sound and quite capable of getting Qtzl home.

Frees had frozen at the bow when Qtzl, still wearing the yellow sundress, turned and waved cheerily. "Oh, hello! You must be Kerwin Frees. I'm Qtzl Fhuuii. Come to see us off, have you? How nice. Isn't that nice of Kerwin Frees, Stan Schell?"

"Very nice."

Frees's voice was so desperate it nearly squeaked. "You can't leave! Don't you understand how important this is to Earth?"

"I think we realize how important it is to *you*." Stan moved to stand in front of the younger man, making him have to dodge a bit to keep his eyes on Qtzl and the FRU. "Would you really have spilled this to your UFO-logist buddies—to the tabloids?"

Ship uttered the closest thing Stan could imagine to a mechanical sigh. "I believe he did, Stan Schell."

Stan glanced up the hill toward the cabin. A small knot of people had appeared at the top of the trail, bristling with cameras and microphones. Someone shouted, and the knot loosened and began to tumble down the hill. Stan turned back to the spacecraft. "Good-bye, Qtzl. Good-bye, Ship. I think I can honestly say I'll miss you." He smiled. "Don't forget to write."

Qtzl's frill bounced and his crest stood up smartly. "I *shall* write, Stan Schell. You'll see. Check your e-mail often."

"I didn't do this," said Frees, pointing uphill.

"Uh-huh."

Qtzl and the FRU disappeared into the Ship.

Frees danced around, putting himself between Stan and the reporters. "I mean it. I didn't do this."

Ship uttered a soft, keening song, like a zephyr through the pines then, moments later, lifted itself majestically into the air. Any sound it might have made was drowned in the trampling

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of flora under the feet of the approaching journalists. Ship hovered above the treetops—posing, Stan thought, wryly—then disappeared in a long streak of light.

Just like in the movies. Stan tilted his head to one side. He wondered if the video currently being shot would be blurred—like the ones in those ever-popular sightings shows.

A babble of voices swamped his thoughts. Microphones thrust into his face. On the other side of them, over a tangle of arms, Frees stared back at him, face sweating.

"What just happened?"

"What did we just see?"

"What *was* that?"

"Can you explain what just happened, Mr. Frees?" Stan asked.

Kerwin Frees's mouth opened and closed like a beached trout's. "It was a spacecraft," finally emerged. Frees's eyes lost their glazed look. He grabbed a microphone. "It was an alien spacecraft that crash-landed here months ago and was mistaken for a meteorite. There were two alien beings aboard, which this man—" He stabbed a finger at Stan. "Which this man hid in his summer cabin. He used the aliens to parlay a successful career for himself as an advice columnist."

It sounded so inane, Stan almost lost himself to hysterical laughter. The reporters prevented him. "That's Stan Schell!" one of them exclaimed, and the many microphones pushed in closer.

"What do you say, Mr. Schell?" an eagle-eyed young woman peered at him from behind a red wind sock.

"And you're from?"

"*The Skeptical Examiner*. We got a call saying that an alien spacecraft was sitting in this ravine. Was that what I just saw taking off?"

"Well, I hate to rain on your parade, but the so-called spacecraft is local. The rest of it—special effects. Hollywood." He smiled at the woman. "I'm sure that makes perfect sense to you."

Frees shrieked. "That's insane! You all saw the aliens! You all saw the ship!"

"Special effects," Stan repeated.

"What about the column—*Ask Arlen?*" asked Frees. "You didn't even know it existed until you saw it was being run with your picture. You tracked the writer here, to your summer cabin. And you found aliens."

"Are you suggesting that *aliens* were writing an advice column?"

The reporters laughed; Frees reddened. "You know the truth."

"Maybe I do. But nobody here would believe a story like that. I certainly wouldn't, and I write science fiction. So my line is—no comment. Now, if you'll all excuse me, I have an advice column to get out."

He pushed past the reporters, ignoring their cries for his attention, and made his way back up the hill. Frees, stranded below, managed to keep all but a few from following him.

Ted Barnett met him halfway up the hill. "What was that all about?"

Stan shook his head. "I couldn't even begin to explain."

"Was that an alien spacecraft?"

"Wasn't that what I said it was?"

"Yes."

"And did you believe me?"

"I'm here, aren't I? I leaked the in-

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formation, didn't I?"

"That begs the question. Do you believe that was an alien spacecraft?"

Barnett hesitated. "I'm not sure. I hate to sound like a rank materialist, but the more important question to me is—are you really *Arlen?* Or was it somebody else?" His eyes grazed the clouds overhead.

"Why don't you reserve judgment until you get my next column?"

Barnett nodded. "OK. How does this guy Frees figure into this?"

Stan glanced down the hill to where the UFO chaser was still drowning in journalistic undertow. "He concocted a story about aliens writing the column—about me hiding these aliens in my summer cabin. He was harassing me."

"And this is your way of getting even."

"Maybe. Or maybe it's my way of getting the aliens out of here safely. Or maybe it's my way of getting more free publicity."

He left Barnett and went back up to the cabin, where he closed and locked the door in the faces of a couple of tabloid reporters. The act gave him a perverse and childish sense of satisfaction. From his office window he watched Kerwin Frees swimming uphill against a current of microphones and cameras. At the bottom of the hill, a handful of people were going over the crash site in minute detail.

Stan frowned. He hadn't thought of that—hadn't considered what kind of evidential residue Ship might have left behind. He called the police and reported that he was being overrun with trespassers. Then, musingly, still not certain what he had just gained and lost and gained, Stan Schell sat down at his computer to answer the day's letters and meditate upon the alien point of view. ■

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Stephen L. Gillett, Ph.D.

JUST HOW "AVERAGE" IS THE SOLAR SYSTEM?

Until recently, astronomy has depended on educated guesses based on very limited data. Now that we're getting more data, things are getting more complicated than we thought!

The "Principle" of Mediocrity

An average, middle-aged yellow dwarf star out in the Galactic boondocks—we've heard the Sun described that way so many times it's become a cliché. And surely it follows inevitably that there must be nothing particularly unusual about the Solar System, either. There must be lots and *lots* of planets out there, and even if Earthlike planets are just a tiny fraction, the absolute numbers must be huge. Right?

Not necessarily. Sure, the Sun is a typical G star. That's an observation; we can look out and *see* lots of similar G stars. But it *doesn't* follow that stellar companions like our System are common, not unless or until we actually *see* some others.

But nonetheless, isn't it simplest to assume that we're typical? Ockham's Razor and all that? After all, that's been the thrust of scientific investigation since Copernicus dethroned Earth to just another planet. The Principle of No Privileged Position has become something of a dogma in thinking about the Universe.

It may be simple, but it merely reflects our profound *a priori* ignorance. We have a sample of one: one planetary system, one habitable planet. And statistics are undefined for a sample of one: the mean, the standard deviation, the moments; all the panoply of mathematical statistical description simply don't exist. They are *undefined.*

And there's a reason to distrust the hypothesis of mediocrity, simply because there's a built-in bias to our situ-

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ation: obviously, Earth must be capable of supporting intelligent life, and our Solar System must be capable of supporting an Earth, simply because we *are* here in the first place! The Earth isn't like Mars or Venus because, if it were, we couldn't be here to notice. The Sun *has* planets because if it didn't we wouldn't be here to see. And so on.

This "Observers' Bias" effect has also been dignified as a "principle": the Weak Anthropic Principle. It's generally applied to cosmology ("the Universe is the way it is because otherwise we wouldn't be here to see it"), but it has other, and perhaps less tautological, applications as well.

So where does that leave us? On the horns of incompatible principles? Not quite: both statements are scientific hypotheses. That is, they aren't just statements of dogma, accepted on faith, but are subject to test.

And to test them we need more data!

The Dead System

One set of observations comes from the rest of the Solar System. Remember all that SF from the '40s and '50s? Mars was *always* inhabited, and usually Venus was too. Part of the legacy of Percival Lowell and his inhabited Mars, as Bruce Murray once put it; but that projection of Earth's fecundity, Martian Elders and all, into the rest of the Solar System can't *all* be blamed on Lowell, or even on Edgar Rice Burroughs.

Of course, it didn't turn out that way. Everywhere we've gotten good data on another Solar System body, it's been dead, with a completeness that's utterly beyond our experience. (And some folks have been in denial ever since!)

In retrospect, of course, at least the extraterrestrial civilization scenarios were naive; given the vast age of the Solar System, how likely was it that *another* civilization (much less more than one, as on Mars and Venus both) would emerge at the same time? And, if they were older than we, why hadn't they *done* anything more? I suspect that humans' activities within a few millennia or so—a geologic eyeblink—are going to make it obvious from *very* far away that technical intelligence is loose around this star!

(I leave it to the social scientists to determine how much the projection of Earth's fecundity out into the Solar System may tell us about human psychology, versus how much it merely tells us about the props that make telling good stories easier.)

So we now know—*observationally*—that the Earth is unusual in the Solar System. It's not just the only terrestrial planet with a large Moon, or the only one that supports liquid water at the surface, or the only one with plate tectonics. So far as we can tell, it is the only one with life, certainly the only one with intelligent life.

How Typical is the Solar System?

Of course, this begs the really interesting question: what about other planetary systems? And that, of course, has been the rub; we've had no data, and it hasn't even been possible to get any data until quite recently.

So we worked with what we had.

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And a paradigm arose that planets were probably not all that rare; indeed, that they're probably a common byproduct of star formation. A star forms from the collapse of a vast cloud of dust and gas, and—depending on its mass and angular momentum—that cloud flattens as it collapses. You ended up with the roughly lens-shaped *solar nebula,* a bulge in the middle representing the embryonic Sun, while the surrounding disk, prevented from falling in immediately by its angular momentum, becomes the birthplace of the planets. As the nebula material, heated gravitationally by its infall, cools, material condenses and clumps together—"accretes"—into larger objects, and eventually into planets.

It made perfect sense. You got little rocky planets in close where it was hot and only refractory rock and metal could condense, while big gas giants formed far away where the volatile ices and gases could also condense. And in between was an asteroid belt reflecting the leftover debris—"planetesimals" that never got accreted because they were stirred up by the largest and early-formed giant planet.

The near co-planarity of the planets' orbits falls naturally out of this model. And although things like the wildly varying tilts of rotation axes, and the differences in rotation rate (not to mention retrograde rotation), were an embarrassment for a long time, they've even gone away in the last 15 years. Accretion was not a nice quiet affair; toward the end of accretion, as lots of half-formed planets careened around in unstable orbits, gigantic impacts gave things a good stochastic stir.

Observational evidence for some of this scenario started to accumulate by the early '80s. Infrared astronomers see quite a few things that are inferred to be dusty disks around young stars, the one around the star Beta Pictoris being the favorite example. Twin, oppositely directed jets of material shoot away from the star; these are inferred to be bipolar outflows of hot gas along the rotation axis of the disk. And such things sure look like the sort of nebulas inferred to spawn planets.

So if planets weren't an inevitable byproduct of star formation, they were at least common. And planetary systems would look broadly like our System, with big gassy planets far away and little rocky ones up close, and maybe even an asteroid belt in between. It all fit nicely.

Except that it just may be wrong.

Desperately Seeking Planets

The problem, of course, with getting some other observational reality checks is that it's extraordinarily difficult to detect planets around other stars from Earth. They're so faint, and the parent star so bright—and above all, so *close*—that it's nearly hopeless without a huge space- or Moon-based telescope.

There are indirect ways, still very difficult, but barely possible with ground-based instruments. One uses *astrometry,* the precise measurement of a star's position in the sky with respect to other stars. Stars, of course, are moving across the sky, and this so-called proper motion is routinely mea-

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TABLE 1.

Star	Spectral Type	Stellar Distance (light-years)	Period (days)	Velocity (meters/ second)	Min. Mass (M sin i) Jupiter=1	Mean Distance (AU)	Eccentricity
51 Pegasi	G2-3	50.1	4.3	56	0.46	0.051	0.012
no evidence of a second companion with mass>Jupiter within 2 AU							
70 Virginis (HR 5072)	G4	59.1	116.7	318	6.6	0.43	0.40
47 Ursae Majoris (HR 4277)	G0	45.9	1107.6	45.5	2.39	2.10	0.03
55 Cancri (HR 3522)	G8	42.4	14.65	77	0.84	0.11	0.05
possibly second companion with period>8 years							
τ Bootis (HR 5185)	F7	59.8	3.313	469	3.87	0.0462	0.018
υ Andromedae (HR 458)	F8	57.4	4.61	74	0.68	0.057	0.11
16 Cygni B*	G1.5	69.8	800.8	44	1.5	1.6	0.63

Confirmed low-mass companions to Sunlike stars, as of December 1996; no doubt obsolete when you read this! The star name given in parentheses below is the Harvard catalog number. All data come from materials in Marcy & Butler's Web site (see the references). Companions thought to be brown dwarfs are not included.

*Not a misprint. This is *16* Cygni B, not 61 Cygni, another nearby Sunlike star that's been featured in SF, and that at one point was suspected to have companions. Like 61 Cyg, 16 Cyg is part of a double system. The A component is also Sunlike (spectral type G2.5V) and is currently about 830 AU away from B. It shows no evidence of a large planet. The orbital period of A and B is unknown, because the orbit is so wide, but it must be thousands of years. Their orbital eccentricity is also unknown due to the lack of a long enough baseline of observations.

sured. If a star has a companion orbiting it, the proper motion path wobbles systematically, because it's the center of mass of the system that's traveling in a straight line, not the star itself.

Obviously, then, the larger the orbiting mass, the larger the wobble. Faint companion stars have been detected rather straightforwardly this way, the white dwarf companion to Sirius being an outstanding example from the last century. However, planet detection, even of Jupiter-sized or larger bodies, is considerably dicier, and detecting Earth-sized objects is currently out of the question.

For a while, it seemed that massive

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planetary companions to several nearby stars, including Barnard's Star, had been detected in this way, but other groups have not been able to reproduce these observations, and none now seems to be taken seriously. The variations seem to have been just systematic errors in the measurements.

Another indirect approach is to use variation in the line-of-sight motion, or "radial velocity," also due to the wobble of the star and its planet around their center of mass. As the companion orbits, the star also moves toward and away from Earth, and that causes a small Doppler shift of the star's spectroscopic lines.

At first glance, this hardly seems more promising! The velocity changes are tiny, on the order of ten meters per second even for a giant planet. Jupiter, 5.2 astronomical units (AU) from Sol, causes a mere 12.5 m/sec variation in the Sun's radial velocity that has a period of 12 years—the time it takes Jupiter to make one orbit. (The AU is the mean distance from Earth to Sun, and a convenient distance measure.) But such changes can in fact be measured with state-of-the-art spectroscopic techniques. Several groups of astronomers have been measuring Doppler shifts with a precision of ~15 m/sec over the last decade. Indeed, Drs. Geoffrey Marcy and Paul Butler, at San Francisco State and UC Berkeley, have recently (fall 1994) upgraded their system to a precision of ~3 m/sec. This represents a precision of something like one in a hundred million; the diameter of a beer can compared to the width of the conterminous US.

There's another problem, though. The maximum variation in radial velocity occurs when we're looking directly edgewise at the planet's orbit. But in general, of course, the plane of the orbit is tilted, and so we don't see the maximum variation. Not only does this make the detection harder, but it means we can only put a limit on the planet's mass. A very large planet, or small star, in an orbit that we happened to see almost "flat-on" would cause the same variation in radial velocity as a much smaller body in a much less inclined orbit. Without other information, then, all we can do is talk about the *minimum* observed mass—the mass we'd calculate for the exactly edge-on case.

This is seriously glamor-challenged research. To build up a data set that means anything requires painstaking measurements over periods of *years*. To detect a companion you have to watch long enough (ideally) for several orbits, to determine how reproducible the signal is. No gee-whiz, flashing lights and quick media-worthy answers here! Just the patient accumulation of data.

The Planets We've Found

Nonetheless, as you've no doubt heard, the search has recently paid off spectacularly (Table 1). However, *none* of the planets found so far are where we would have predicted from our standard planet-formation models. All are giant planets (at least half the size of Jupiter, and most considerably bigger) that are *considerably* closer to their parent star than Jupiter is to Sol. In a recent review, Butler & Marcy

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tentatively classify these objects into the following categories.

The first category is "51 Pegasi" planets, named after the companion to 51 Peg, which was the first planet discovered by the radial-velocity technique, in late 1995. These planets all have nearly circular orbits that are within a fraction of an astronomical unit of the parent star, so that their orbital periods are on the order of a week or less. Yet, despite a proximity to the central furnace that makes Mercury's distance seem downright temperate, they're giant planets. Now, even a gas giant planet, one dominated by helium and volatile hydrogen compounds like Jupiter, could survive so close to its star, simply because its massive gravity field keeps its atmosphere from all boiling away. But obviously such a planet could not have *formed* in this position.

One possibility, modeled by Lin, Bodenheimer, and Richardson (1996), is that planets may not tend to stay in the place in the disk where they formed. Due to tidal interactions with the disk, the growing protoplanet tends to spiral in toward the parent star, sweeping all before it—including any planets that may have formed inward from it. Even if it avoids falling into the star itself, the planet still ends up in a very close orbit. Similarly, Andrea Ghez at UC Los Angeles suggests, from her and her co-workers' studies of disks around stars evidently still in the throes of accretion, that the usual situation is for most of the disk material to get swept into the central star. There seems to be too many other masses wandering around near the average protostellar disk for much to survive in orbit.

Marcy & Butler's second category is "70 Virginis" objects, again named after the prototype. These not only come very close to their parent star, but have very eccentric orbits. In the case of the 16 Cygni B object, the variation from closest approach (pericentron) to the farthest is about 2 AU! (As an aside: since this planet orbits one star in a wide binary system, it also furnishes the first direct evidence that planets can form in at least some binary systems.)

Such eccentric orbits are a puzzle. One result of accretion from a disk is that planets should have nearly circular orbits, because drag from the disk tends to smooth out the orbital motions. So something—maybe a catastrophic gravitational interaction during accretion, such as a near-miss between protoplanets—must have happened to scramble the orbits.

I mentioned that we do know that the late stages of accretion even in our own System were pretty catastrophic. As I described in *Analog* a while back ("Worldlets in Collision," July, 1990), half-grown planets careened around for perhaps a hundred million years, with some serious consequences. One such consequence was the Earth's Moon, now commonly thought to have resulted from a collision of the nearly grown Earth with a Mars-sized planetesimal. Another was Uranus's axial tilt of ~90 degrees, probably the result of an off-center impact by an Earth-sized body. Yet another may be Mercury's anomalously high density; most of its rocky crust

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and mantle got blasted off in a mega-collision. And so on.

Maybe, though, compared to what's happened some places, what we see in the Solar System was pretty small beer.

The Neptune satellite system may offer a small-scale example. Neptune's large moon Triton orbits backwards, in a so-called "retrograde" orbit, the only large satellite to do so. Outside Triton's orbit the only satellite is tiny Nereid, in a highly elliptical orbit. A popular explanation for this situation is that Triton was a leftover planetesimal that had a head-on with a previous Neptune satellite. That slowed it down enough to be captured—at the cost of deranging the rest of Neptune's satellite system. Only inward from Triton are there several small, well-behaved satellites that probably represent what's left of Neptune's original family. (Triton's orbit is also now essentially a perfect circle, but that's a result of tidal action by Neptune over the last few billion years.)

The last of Marcy and Butler's categories is occupied by the planet of 47 Ursae Majoris. It has a near circular orbit and, with an estimated distance of 2.4 AU, comes closest to looking like a giant planet in our own System. It's still less than half as far from 47 UMa as Jupiter is from Sol, however, and evidently must have migrated inward as well.

Where are the Planets?

So there have been some astounding successes with the planetary searches just in the last year or so. But really, not much has turned up. The seven bodies in Table 1 represent an investigation of roughly 300 stars. In fact, another group of investigators (Walker et al., 1995) concluded, from a 12-year search of about 20 nearby solar-type stars, that there was no convincing evidence of Jupiter-sized or larger planets around them. (Their search stars included such famous—at least for SF—stars as Tau Ceti and Epsilon Eridani.)

Of course, there are serious selection effects at work here. As Marcy and Butler point out, very large planets close to the parent star will be easiest to detect. Not only is the radial velocity much higher, because the planet is exerting a proportionately much greater gravitational tug, but the week-length periods are easier to see and verify. Even if you can detect the radial velocity of a planet at Jupiter's distance, you'd have to get a dozen years of observation to document a full orbit.

But nonetheless, it seems that at least large planets, in the places we're used to, aren't as common as we'd thought. Moreover, brown dwarfs, stellar-type objects just a bit too small to turn on the nuclear fires, also are turning out to be very rare, too, at least in orbits around Sunlike stars. They're considerably more massive than planets and so should be lots easier to detect. The minimum mass for a star, the point at which sustained hydrogen fusion takes place in its core, is about 80 Jupiter masses, or 0.08 solar masses. That leaves a lot of room for objects more massive that still aren't stars.

But although they should be *much* easier to find than Jovian-type planets,

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only a handful of brown-dwarf candidates have been found—and surprisingly, *no* convincing brown-dwarf candidates have been found by the high-precision radial velocity searches. It seems the data are good enough that we can now say that brown dwarfs are not formed commonly, at least as a byproduct when stars are formed.

David C. Black of the Lunar and Planetary Institute in Houston has suggested that not only the absence of brown dwarfs, but the paucity of Jupiter-sized planets is approaching statistical significance. It may be that planetary systems like ours, at least with a Jupiter at a reasonable distance from the star, are not the norm.

By Jupiter

No Jupiters. So what? Jupiter's hardly a habitable planet! In fact, the conventional wisdom has been that Jupiter is a *problem* for forming habitable planets.

The reasoning is as follows. Jupiter probably formed at the "Snow Line," the place in the nebula where solid H_2O—ice—became a stable phase. Since H_2O's an exceedingly abundant compound, this dumped lots of solid condensate into the nebula at that point. After clumping together for a while, the embryonic core of Jupiter then reached a point where its gravitation could pull gaseous material right out of the nebula. It then grew rapidly by gravitational runaway, before any other planet, probably within 10 million years.

At that point its gravity started stirring up the orbits of the remaining planetesimals. To accrete, planetesimals have to collide very gently, and to do *that*, they have to be in nearly circular orbits that bring them together tangentially. Having another body of any size orbiting the proto-Sun disrupts those circular orbits; the gravitational tug "pumps up" orbits, so that they get more elliptical and orbits start to cross. And then the planetesimals don't come together gently; they crash! And don't accrete.

The usual interpretation of the asteroid belt is that it represents the tiny fraction of leftover planetesimals that weren't thrown into planet-crossing orbits—or out of the System completely—by Jupiter's perturbations. Of course, this also kept those objects from accreting into planets. In fact, Mars has been proposed to be a stunted, shrunken world because most of the planetesimals that would have fed it were scattered away by Jupiter.

But according to George Wetherill at the Carnegie Institute, Jupiter may nonetheless have had an important role in making the Earth habitable. By scattering away so many planetesimals early in Solar System history, it insured that large impacts would be rare later in geologic time. And that may have given the biosphere the stability to evolve multicelled life-forms, and ultimately intelligence. You can put up with a Chicxulub-scale impact—a dinosaur buster—every hundred million years or so, and maybe you even need one once in a while to jar evolution of the ruts it falls into. But Chicxulubs every ten million years, or even more often, would be too much.

So the dearth of Jupiters, if it holds up, may have profound implications

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for the abundance of technical intelligence. Even if many of those stars have a few rocky worlds in close to the fire, they may be so battered that they can support little but microbes. Forever.

To Build a Jupiter

And Jupiters may be hard to make. It seems you need to have a very delicate balance in the mass of the protoplanetary disk. If the disk is thick, you can grow a large planet easily enough, but then it's likely to migrate inward due to continued interactions with the disk. Alternatively, maybe catastrophic interactions are common when growing large planets, so that at best the planet's left in a strongly elliptical orbit—if it's not ejected from the planetary system completely.

On the other hand, if the disk isn't thick enough, you won't grow a Jupiter at all. And observations by Zuckerman et al. (1995) suggest that commonly the gas in the disk dissipates very quickly—maybe so quickly that a Jupiter can't form.

How Typical Is the Sun?

So our planetary system, despite our working assumptions for most of this century, may not be so typical after all. Now let's look at the Sun. Is it *really* such a typical G star?

In many ways, yes. It has a typical chemical composition for a disk-population star of its age and luminosity. (I suggested several years ago that the Sun has an unusually low carbon/oxygen ratio, which would have had major implications for the habitability of its rocky planets. See "Carbonosis," March 1993. Alas, the "carbonosis" scenario turns out to be rare; new detailed spectroscopic surveys over the last 10 years or so have shown that C/O ratios high enough to cause "carbonosis" are unusual.)

But it turns out the Sun is atypical in other ways. Dr. Guillermo Gonzalez at the University of Texas at Austin has pointed out that the Sun's galactic *orbit* is unusual for a star its age. First, its eccentricity is low (~0.08), which means its orbit stays out here in the galactic hinterlands, never approaching the core within about 28,000 light-years.

Second, the Sun's oscillation above and below the Galactic plane, what astronomers call the w-velocity, is unusually small. (A star's orbit around the galactic center is not just a Keplerian ellipse because of the mass of the stars in the galactic disk itself. That superimposes another motion, an oscillation above and below the disk.)

Third, the Sun's orbital period is such that it crosses spiral arms very seldom, at least if (as is commonly now thought) the spiral arms are vast, sluggish density waves in the tenuous interstellar medium.

Why are these important? If the Earth is typical (*that* again!), you need *lots* of time to evolve an intelligent species. Although microbial life (prokaryotes) apparently showed up almost as soon as the gigantic impacts tailed off, almost four billion years ago, it took almost another three and a half billion years to evolve multicellular life, and another half-billion years plus after *that* to get intelligence.

So, to get a chance at a technical

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civilization, you apparently need to have a nice, stable galactic environment for almost five billion years. And that may be a problem.

First, the planet needs to stay far away from the galactic core. Despite all that SF about the vibrant civilizations in the Core looking down on us rustics out here on the Periphery, in fact the Core is a very hazardous place for a habitable planet, at least over geologic time scales. The core of the Galaxy undergoes vast explosions once in a while, powerful enough to lethally irradiate everything within a few thousand parsecs. It seems that every now and then a tremendous gob of matter falls into the black hole thought to reside at the galactic center, with the result that all hell breaks loose. Other spiral galaxies, called "Seyfert galaxies," seem to be undergoing such cataclysmic events in their cores right now, and many astronomers think a "Seyfert phase" is just something any spiral galaxy—including the Milky Way—goes through once in a while.

Even without core explosions, stars in the core are very close by our standards, a fraction of a light-year apart on average. Catastrophic perturbation of planetary orbits must be common, over geologic timescales, and even stellar collisions must happen once in a while.

The Sun's near-circular orbit keeps us out of all that.

Second, a habitable planet needs to stay in the disk of the Galaxy as much as possible, so that when the core does explode, all the gas and dust clouds in the disk can act as shielding. If the planet's star has a large w-velocity, so that it oscillates far above and below the disk, the planet obviously has a much better (or worse!) chance of being caught in the open when the core pops off.

And third, spiral arms are a dangerous place to transit for a habitable planet. Close passes by giant molecular clouds (the spawning grounds of new stars) can perturb planetary orbits, and even if planets' orbits are unaffected, the star's orbit around the galactic center is affected. And all such interactions tend to increase orbital eccentricity over time.

In fact, though, Neptune's orbit is nearly circular ($e = 0.0087$); only Venus's is more so. This means that Neptune's distance to the center (not the focus!) of its orbit varies by less than five parts in a hundred thousand. That's considerably better circularity than the run of the mill at your local machine shop! Such a round orbit for the outermost large planet indicates the Solar System has avoided Close Encounters of the Perturbing Kind throughout its history.

Spiral arms are also the sites of most supernovas, because the stellar progenitors of such gigantic explosions are so massive, and hence so short-lived, that they don't have a chance to move far from the clouds where they were spawned before they explode. And obviously the effects of such explosions on planets in the general neighborhood (say 10 to 20 parsecs away) are not salutary, as Poul Anderson pointed out fictionally in the pages of this magazine 30 years ago ("Supernova," January 1967).

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So, maybe the Sun and its family have been lucky; most otherwise OK stars don't keep a favorable environment long enough to evolve intelligence. (Alas, growth and development being thwarted by violence in the 'hood is, of course, not a phenomenon confined to habitable planets!)

Conclusions

As Ben Bova put it (*Analog,* June 1996), there may be no such thing as a "typical" planetary system, any more than there's a "typical" world in the Solar System. Maybe the nice concentric pattern of orbits in our System, with the giant planets neatly parked out several AU away where they do no harm, is highly unusual.

We should know much more even over the next few years (and I expect that Table 1 is outdated as you read this). As the radial-velocity studies accumulate longer baselines of data, giant planets in more familiar sorts of orbits, with distances measured in AU rather than tenths of AU, and orbital periods of years rather than days, should become much more obvious. If they exist. (And funding permitting, of course!)

In the next century, more direct techniques are possible. Optical interferometry is one of the most exciting: the linking of "gangs" of optical telescopes so they can act as one huge, high-resolution aperture. This is, of course, already routine for radiotelescopes, but light waves are so much shorter that it hasn't been practical on Earth. You have to hold the components of your telescope steady to within a wavelength, and the Earth is much too jiggly a place, between natural seismic activity and humans' machines, to keep your telescope steady within a light wavelength. An optical interferometer on the nice, quiet Moon, however, is a very different story. See the article by Burns et al.

Are we typical? More data! More data! ■

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James Van Pelt

THE BIG ONE

"Top level" contact is not necessarily the most important kind. . . .

Illustration by Dell Harris

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Mostly I fish to get away from the world. Retirement's like a bad cold: once you've got one, no one without one wants to be near you. You go off by yourself and deal with it the best you can. Since I quit work, my life's a full-time vacation. I fish. I listen to the news. Lots of stuff now about the aliens. Lots of worry and fuss about how can we deal with them. Do we have enough points in common to have diplomatic relations? What are their intentions?

It doesn't help that they aren't talking much. They show up in Washington, Paris, Brussels, and Canberra, spend some time with the governments, then spread out. Do you regular news hounds read those tacky tabloids? They're full of alien sightings. Here's an alien at a supermarket, they say; here's an alien at the horse track; here's an alien at a graveyard. Can't tell them apart. Don't even know how many of them there are.

I got some thoughts on the matter myself. Everyone does. But no one's been interested in asking an old fart like me my opinion, so I pack up my gear and head for the mountains every chance I get. Let you folks deal with it. The trout are waiting and that's all that matters to me now.

I fish Blue Bottle Creek. You ever been there? It splashes down the mountain, rushing and rumbling the whole way, hissing into calm spots behind rocks, then blasting into spray at the next. And the tiny pools where the fish hang out are near impossible to drop a lure into. It takes a keen eye and a steady wrist to flick an eighth of an ounce of Daredevil into one without overshooting or falling short into the white water around it. On top of that, the bottom is full of waterlogged branches and jumbled up rocks that want to snag that lure and hold it forever, and willow and tamarask overhang the banks waiting to catch a cast that's too high.

That's why I fish the Blue Bottle, and have for nearly sixty years. You feel like you've really accomplished something just getting the hook into a place where a hungry fish can see it and clomp on down.

Of course, if you can do it—standing in the iron-cold water—if you can hold your breath just so, draw back the rod barely enough to avoid the underbrush behind you, snap the lure forward and release the line at the instant you should, that lure will drop pretty as you please into one of those puny pools, and more often than not (the fish gods willing and your mind in a good place) a Rainbow or Brookie will latch on. Oh, those are the moments. Even now, sixty-seven years old and more fish through my creel than most fishermen can imagine, there's still that electric zap of the fish taking the line and the reverent tip of the rod bowing to the water to take away everything in the world that isn't fish and stream and pulsing rod vibrating with the life at the end of the line.

Seeing as the Blue Bottle isn't your regular creek, though; not an easy one with broad, flat banks and slow spots the size of parking lots that a blind man couldn't miss even if you spun him around a few times, I was surprised to see another fisherman

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fishing one of my favorite holes. I've gone whole days without seeing a soul on this stretch of water, but there he was. And I was so taken aback—I mean, when you fish a tiny creek, and your day's been nothing but wading and casting and the loneliness full of lively little lights dancing off the ripples—that it took me a moment to notice he was an alien.

I'm not a rube, exactly, so I know what one looks like. Like I said, they're on the news all the time anyway. Fact is, they're practically human, and he wore regular fishing stuff, so you can understand how I mistook him at first. But he had those extra-skinny arms and weird fingers that look like they'd go just as easy forwards as backwards, and his face, underneath a brand new, floppy khaki job that I'm pretty sure I'd seen for sale at Jack's Bait and Tackle, was all those inhuman angles without ears or mouth. Just a couple of depressions and a slit.

It didn't strike me at the time how unusual his being there was. Later, when you news folk caught wind of the story, I figured otherwise. Right then, though, he was just another guy on the stream.

And sure as I'm sitting here now, he was fishing. Not having a very good time of it either. I kind of faded into the brush to watch. First, he pointed his rod at a likely looking spot—the water was roiling pretty good in the Blue Bottle, so an accurate cast was even more important—and I heard a little pop. Something flew off the end of the rod and splashed into the pool, and an instant later the lure, or whatever it was, ripped out of the water and flew back to the end of the rod. It couldn't have been in the pool for three seconds, and I figured that wherever he used to do his fishing, the fish were a considerable sight faster than ours.

Pretty high-tech rod. No line as far as I could tell. That lure rushed back to the end of the pole like a bolt might to a strong magnet. Still, its action looked like any you've ever seen. When the current dragged, its tip pulled down, and when the lure sprung clear, the rod snapped back. Fishing's fishing, I say, and that alien was fishing, poor as it was.

For ten minutes he struggled at it. He worked the high end of the pool, then the low end. It was obvious he was no stranger to the angler's art. He tried upstream and downstream casts. He fiddled with a lumpy thing where his reel should have been, which must have changed the depth of the lure, because for a while the thing skipped back across the surface, and then later he snagged the bottom, doubling that rod up. Lost the lure. Had to dig another one out of a pocket. Lost that one a minute later, and I could see he was getting frustrated.

Well, I had a choice here. After all, a fisherman goes to a stream like the Blue Bottle because he *wants* to be alone, and I figured he must have been no different. I don't care where you come from or who you are, there's something sacred in that. Like someone once told me, "The hours you spend fishing don't count against all the hours you get in life." So, even if he's not catching anything, he at

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least deserves the privacy of the experience. But a part of me watched this guy (hell, I don't even know if he *was* a guy—no one's too sure about that part of them) and I thought, if I were fishing a strange stream, and I didn't know what the fish were biting on, I wouldn't mind someone giving me a suggestion or two. You know, just a push in the right direction.

So I stepped out of the bushes and waded downstream, making plenty of noise so I wouldn't surprise him.

"How're they biting?" I said, to be polite.

He shrugged his shoulders and pointed to his chest where nothing was there, and I nodded to show him I understood.

I said, "No translator thing, huh?"

He shook his head. You news guys kind of dwell on the little you do know about the aliens, like the fact they understand our speech fine, but their voices don't get themselves around our words too good, so they have these boxes that speak for them. No reason for him to be wearing his if he thought he'd be doing a spot of fishing on a creek no one ever came to.

"What'cha fishing with?" I said.

He reached up to the end of his rod and plucked the lure off, holding it out to me on the palm of his weird hand. His fingers were too long and there weren't any knuckles, and in a lot of ways they looked more plastic than animal, but I didn't pause—I thought it'd be rude to act like he was any different from anyone else—I took the lure.

At first I wanted to laugh. I mean, if I'd stuck a hook through a dirt clod, it might look like his. No self-respecting creek fish would bite on as unlikely looking a thing as that, but then I thought my lure probably would look just as silly to him, so I snapped the Daredevil off the swivel and handed it over. It's just a red and white striped spoon with a hook. Doesn't look like a bug. Doesn't look like anything natural, but trout go for it sometimes.

He turned it over in his hand and bounced it, feeling its weight. He nodded as if he approved.

"Here," I said, "Fish in these parts are kinda particular. Maybe I can show you a thing or two."

He gave me back the lure, and I readied my line.

"We've spooked them here, so we got to move to another pool where they haven't seen us yet." We walked right up the middle of the stream because the banks are overgrown, past the spots I'd already fished. He placed his feet carefully, like he was old, then I decided that he was just getting a feel for the stream. Who knows what the rivers are like in his world? Heck, just going from the Blue Bottle to Jumbo Creek a valley over is a switch. Here the bottom's moss-covered stones all round and slick, and there it's all busted-up slate and pea-sized gravel, so I don't blame the alien for treading lightly. Heck, I'm not as fast as I used to be myself.

I peeked over a boulder that marks a bend in the creek. On the other side were a pair of those tiny holes I was telling you about. Ideally, I'd fish 'em from the side, dropping the lure in the foam at the far side of the pool, then working across the current, but

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there's no way to get to the side without the fish seeing you, so I'd have to try the cast from here.

The alien moved out of the way of my backswing, his pale eyes glittering with interest, so I felt kind of pressured to do it right. Wouldn't look good if I hung the hook up in a tree or something. I've been doing this a long time, though, and my habits carried through. The lure plopped into the edge of the first pool instead of splashing into the middle or clanging off a rock, which would've scared the fish for sure. The alien studied my lure as it came back. How fast? he was probably thinking. How deep? Water was as clear as air, and we could see that spoon wiggling and waggling as I reeled her in.

Next cast I got a strike. The trout jumped once, dove for a shadowy spot under the rock, but I'd already reeled in part of the line, and he pulled up short. A few seconds later, he was flopping in my net.

I held the net to the alien, and he peered at the fish without touching, which was good. These creek trout don't take much handling. I pulled him free of the net, measured him against the creel—he was a smidge under ten inches—then unhooked him as gentle as I could and let him wriggle free. Water felt cool against my wrists, and I rubbed the fish's slipperiness off my hands.

"Someone else will have a chance at him now," I said, and the alien nodded. Deep in my creel, I found two other Daredevils and offered them to him. "Maybe you ought to try one of these."

He hesitated. I thought, heck, if it were me, I'd be embarrassed to have another fisherman tell me my lures were no good, and maybe that's what was going through his head. But he took them, hooked one in his hat, like mine, and pressed the other to the end of his rod. Don't know what held it there, but it dangled free and easy like it ought to.

He nodded his thanks and headed upstream. I watched him picking his way among the boulders, walking in the water when he had to, until he vanished behind a willow stand twenty yards away.

I thought, here's a story to tell the grandkids. I taught an alien how to fish. Shoot, they'd never believe that, and I laughed. Laughter sounds a lot like creek water on rocks. It blended in real well.

Rest of the afternoon I worked through my favorite spots downstream. I tell you, there's a lot to be said about water and rocks and looking at a brook like this one the way a fish must see it. And it started me thinking about the Universe—not that that's unusual for fishing—and all the wonder of it: I'm flipping a lure into little patches of calm water behind rocks, beneath overhangs, along the banks; reaching in with my lure to see what lives there, and every once in a while I find out. Kind of like those aliens trolling through space, until they fetched up on our calm spot and found us. Makes space travel sound right restful, thinking about it that way.

Meanwhile, everyone else is in a lather about the aliens. Heck, from the one I met, they seem regular

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enough. Not all that different. Course, I have no confidence about that. Maybe I read him all wrong. He was from a strange world. Got his own way of seeing things. Maybe aliens and Earth folk can never get along. I heard a commentator talk about "modes of commonality," which is just fancy for stuff we can agree on. Maybe there isn't enough of that, and the aliens will go away, figuring we're a bad bet. Or worse, like some folk fear, they're judging us. If we don't pass the test, then they'll just dust our little rock off.

You reporters sound plenty scared. Lots of worry.

Still, flicking a lure into the water soothed me, so I wasn't really stewing over those questions. Air smelled like fresh-cut watermelon, all alive and tasty. Water rolled around my calves, tingling where it splashed high up, and numbing everything below. I had a few good strikes. Brought some of them in. Lost a couple of others. Finally, the Sun slanted long and low through the pine on the top of the hills and, fishing pole resting on my shoulder, I headed for my car. A long day of fishing like that just puts the life back in a man.

And there, leaning against my car, was the alien. His clothes were wet to his armpits. Somewhere along the line he must have slipped and fallen in. Told you that the rocks were a bother in the Blue Bottle. He waited until I got close, then straightened up. He held out his hand, and there were the two lures. I can tell you, I didn't think I'd see those old things again. I'd already written them off to interstellar diplomacy. My contribution, as it was, to peace among the stars, but there they were, glittering in that setting Sun, so I took them and dropped them into the creel.

"Any luck?" I asked. I looked around. My car was the only vehicle in sight. Don't know how he got there.

He nodded, holding up four fingers.

"Great," I said. "How big?"

He put his hands less than a foot apart.

"Yeah," I said, "Stockers. We see a lot that size from the hatchery."

Then he made a fist with one hand and swiped the top of it with an open palm.

"Sorry. Didn't get that," I said.

He repeated the gesture, then waved his fingers back and forth like a fish swimming.

I laughed. "Ah, one got away."

He nodded.

"How big?" I said. The Sun was setting behind his back. The light was all yellow and dusty now, full of pollen, and I felt like I was in the middle of a Norman Rockwell painting: two fishermen standing by the side of the stream at the end of the day, swapping stories.

He held his hands about eighteen inches apart.

"Really?" I said, and something in the tone of my voice must have caught his attention, because he lowered his eyes sort of sheepishly, it looked like to me, and moved his hands four inches closer.

"Wow," I said. "That's a good fish."

He nodded, and I thought he

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seemed happy. Couldn't really read anything for sure in that face of his.

We stood there, sort of awkward like for a minute, then I said, "Well, I got to head on home."

He didn't make a gesture or anything. He just spun on his heel and walked away from my car, up the hill, and I watched him until he was out of sight.

I stowed my gear, started the car, drove away from the stream, and I was thinking those folks in Washington are all hot and bothered over nothing: tiptoeing around the aliens and wondering if we got anything in common. Shoot, even a retired old fisherman could see right away we got no cause for worry. If this alien was typical of the rest, we're gonna be OK, because any fool could tell you that there hasn't ever been a fourteen-inch trout in the Blue Bottle, but a lot of human fishermen will swear that the one that got away was at least that big. ■

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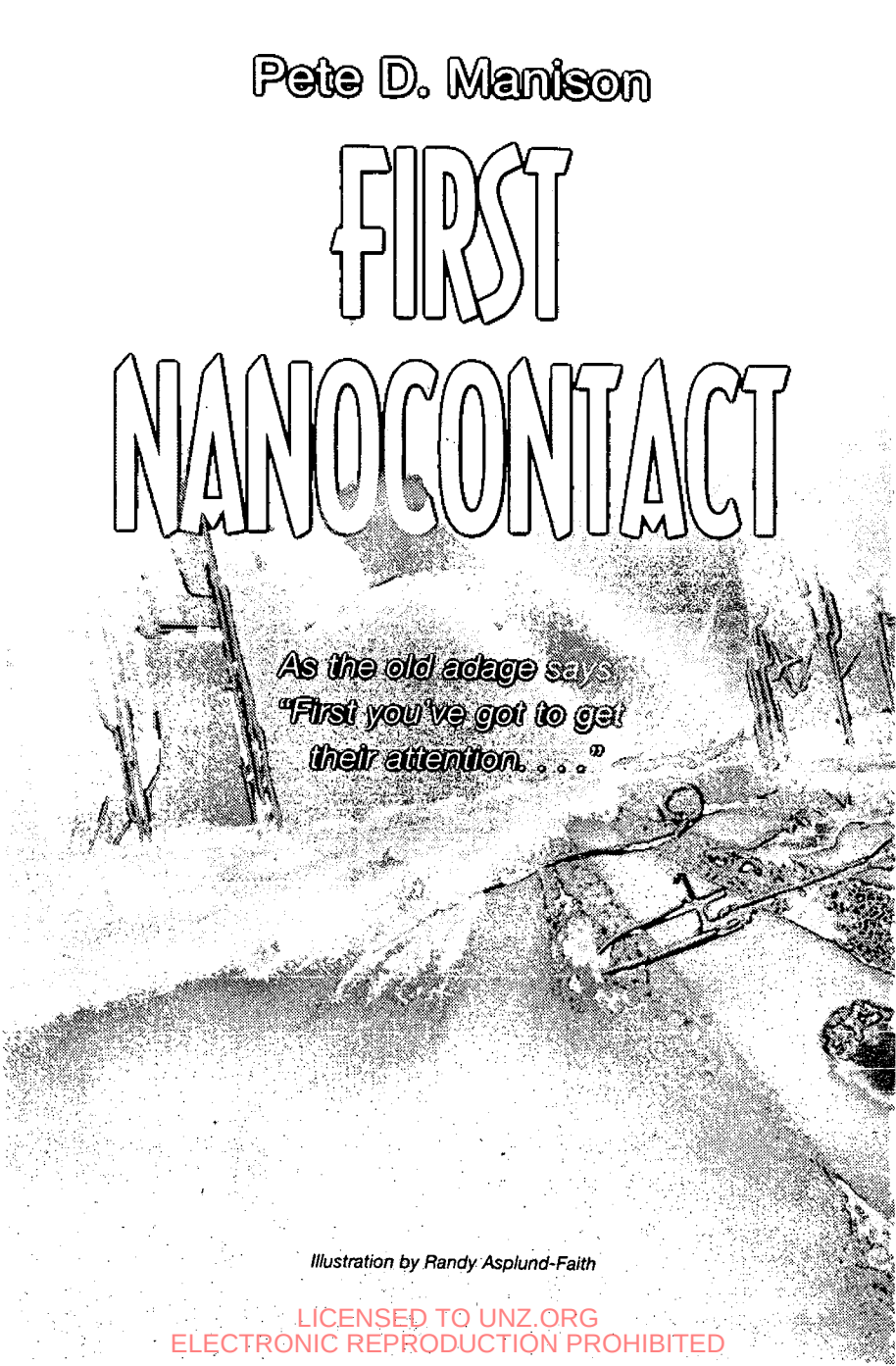
Pete D. Manison

FIRST NANOCONTACT



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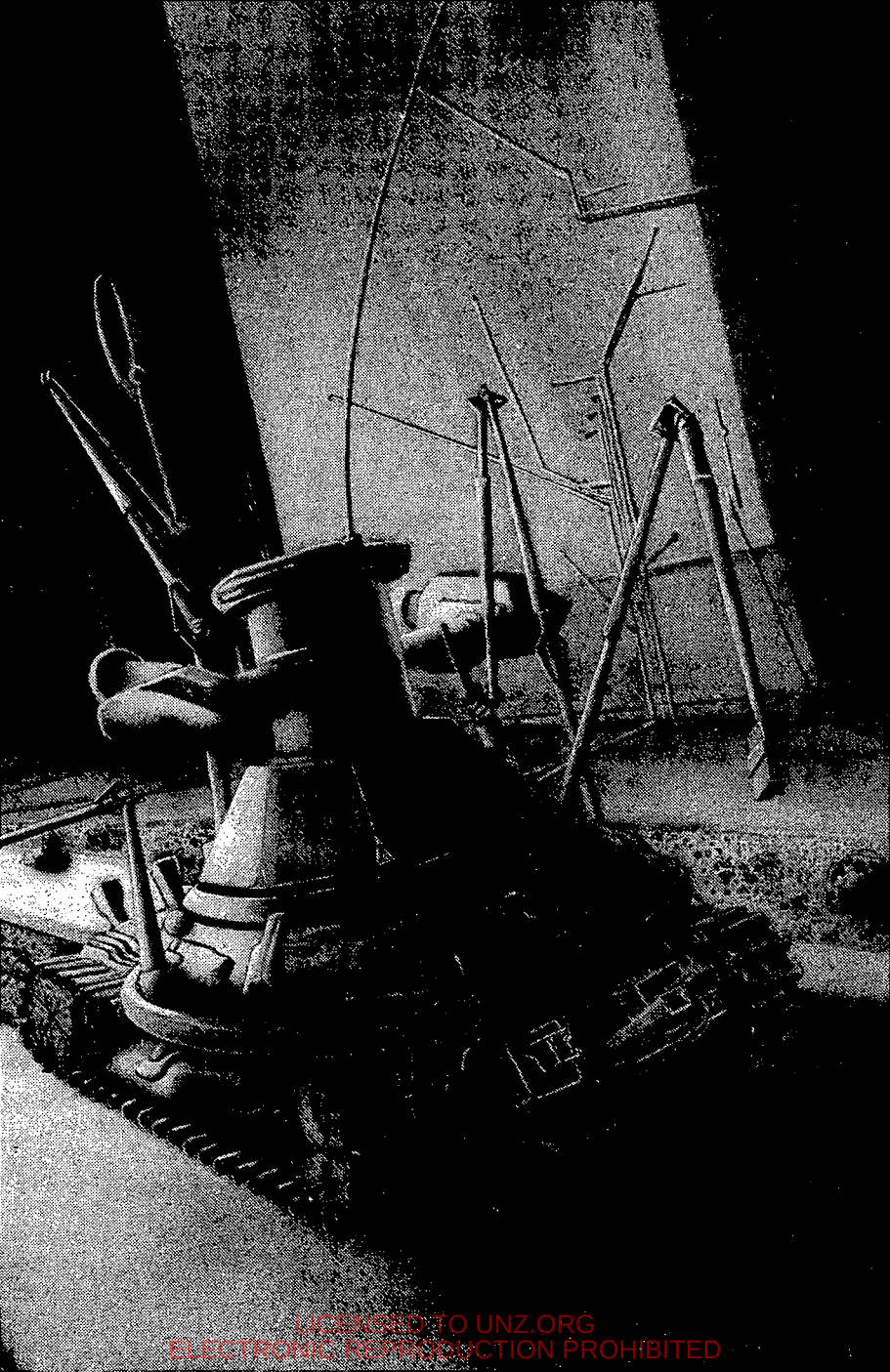

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"It's all just fuzz. See? And only a month out of warranty. Doesn't that figure? Doesn't that just figure?"

Kevin Mitchell Conrad shrugged. Chomping on his gum, he thought about how sick he was of making these damn service calls. Computers, TVs, VCRs. What a waste. He was cut out for more. He could feel it. But a guy had to make a living, didn't he?

"Don't sweat it, Pop," he said, turning his cap around so the control goggles would fit. "Used to be, I'd have to take 'er into the shop, break 'er down, charge you out the—I mean, charge you an arm and leg on labor, all just to replace a chip or maybe clean up some dust that was shorting out a component." He put on the gloves, tested the leads to the control box. Then he clicked on the goggles. Green lights winked happily. His view, at the moment, was only of darkness.

"I just hope you can get this thing working," said Mr. Meekly, the middle-aged customer. "I've got three grand tied up in that dish outside, and tonight's the big game, and, well, I know it's illegal but the boys down in the city are blacked out and I promised them I'd tape—"

Yada, yada, yada, Kevin thought. *Always the same with these people. Gotta have it. Gotta have it* now. Well, that was what they paid him for—the quick fix. Still, it struck him as a waste. With this technology, he could be working on shuttles. Hell, he could *be* in orbit. Doing something that mattered, something meaningful. Not—

"And then my wife's got her soaps in the morning, and all three of them come on at the same time, so she'll have a conniption fit if it isn't working, and then who'll she take it out on? Me. That's who. So you just—"

"I work better in silence," Kevin said, and he blew a bubble. Control box on. Transmitter on. VR linkup confirmed.

"Activate microbot," Kevin said. The black, briefcase-sized box that represented his life savings gave a faint hum. Then he got small.

"Hey, kid. You all right?"

Kevin grunted. "Yeah . . . yeah. Do me a favor, will you? See the button on the right top corner of my case? Press it."

Click. Light flowed through the goggles. Blue, yellow, green. It was all blurry, but he didn't bother to adjust it. He'd need to focus in tight to do the job.

"Got it," reported Meekly.

"Great. Now see the little black disc that popped up?"

"Yes. Is that the microrepair robot?"

"Huh? You can *see* the disc, right?" Stupid customers.

"Yes."

"Great. Pick it up and put it on top of the VCR's grill."

The blurry colors moved. Kevin felt dizzy.

"Got it. Now what?"

Kevin moved his right index finger, gently detaching from the carrier disc as he tested the microbot's control link. He could feel the tiny machine around him like a second body. A twitch of his left middle finger kicked in the bot's headlights. The grill holes beckoned like dark cave openings.

"The VCR's on, right?"

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"No. I turned it off. I thought—"

Kevin sighed. "Well, turn it back on, will you? How can I find the problem if there's no power going through the circuits?"

"*Sorry*. I thought it would damage the repair bot."

Bitch, bitch, bitch. Whine, whine, whine. Machine-dumb. Panic-stricken at the thought of missing the big game. Kevin almost took off the goggles right then. He would have, too, if it hadn't been for the light bill, the phone bill, the rent, the groceries, the gas-guzzling van, the insurance, and, oh yes, the payments to Microrobotic Business Supplies, Inc.

"It's insulated," he told the man calmly. "Go grab a Fresca or something."

He heard the click as the VCR's power was switched on, but it sounded faint and far away. He was already entering the trancelike state that allowed him to control the bot like it was a part of his own body.

Through the air vent, down, down. Into the machine. Kevin found the motherboard, rolled forward onto the printed circuit highway. Integrated circuits towered over him like office buildings that had sprouted legs. His headlights flashed off the solder ahead of him, but beyond that, to the sides and rear, it was dark and silent, hauntingly empty.

Probably just some dust, he thought. It was dirty in here. Chip terminals grew fuzzy beards, and what looked like small rocks strewn about the board beneath him were really individual grains of dust, their proportions, like everything else, exaggerated by his microbot's tiny eye.

Kevin stopped. Extending two probes, he measured the potential difference between two solder joints. Readouts scrolled up his goggles. The voltage was nominal. He moved on.

There. His eyes were adjusting, the bot's senses growing sharper. The bot's computer represented electricity as a faint blue glow in the circuits. Except there. Kevin zoomed in. Yes, that whole area was dark. No power. Nothing. It looked like half the signal recognition assembly was out.

"Great," he whispered.

Faintly, far away, a voice said, "What is it? What have you found?"

Kevin ignored the voice, twitched his right middle finger. It was a long way to where he wanted to go. He'd have to move fast. That was the trouble with microbots, he always thought. They could do so much—monitor cells from the inside, recon hazardous areas like reactor cores or shuttle engines, do almost *anything* a man could do if he could shrink down to a few million atoms in size. But being tiny made you slow. If a microbot covered an inch in fifteen minutes, it was cruising. That inch could feel like miles.

"What was *that?*"

Kevin stopped, rotated his right tread backwards so that his body pivoted to the right. The headlights bounced off a bright, shiny coil of metal that towered up into the darkness. The tape ejection spring. Nothing moved. And yet . . .

"Is something wrong?" a tiny, faraway voice asked.

Kevin sighed, rotated back to the left, and headed for the dark area

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again. "Just seeing things, I guess," he muttered.

The blue, comforting glow of powered-up circuits dispelled his unease, and by the time Kevin reached the fringes of the dark zone, he'd almost forgotten that something *had* moved back there, something even smaller than he was, something he'd never seen before.

"Now we're talking turkey," he muttered. Tapping into a circuit confirmed what he had already suspected: the signal recognition assembly was completely dead. Experience told him what to do. He'd circumnavigate the dark area, and somewhere along the perimeter he'd find a melted connection or a bit of dust or a burned-out diode. . . .

Or . . .

"I *know* I didn't imagine that." He spun to the left, sped forward as he brought the headlights up to their brightest setting. There *was* something moving up there. Faster, faster. He got close enough to make out a shape: vaguely cylindrical with a thickening near the top. Then it darted between two leads to IC13 and was gone.

Weird, thought Kevin. He'd heard of bugs in the machinery. Hell, he'd even seen a few. Sometimes cockroaches would nest inside a radio or computer and drive the owner nuts. He didn't dare spray in there . . . But this was different. Even an ant would have towered over the microbot. This thing had been *small.*

"Are you getting anywhere?" a distant voice asked. "Game's on in forty-five minutes."

Right, thought Kevin. *The game, right. The flippin' game.* Kevin kept driving. He retraced his path to the edge of the dead area and began a careful probe of the perimeter. Five minutes later, he found the trouble.

"I don't *believe* this."

There was the power line, a giant red snake coiling down from the darkness. And there was the input junction for the signal recognition assembly. And *there* was something he had never seen before in his life. Cautiously, he eased the bot forward.

The red power cable had a ring of tiny, interlocking metal pieces around it, something that looked a little like a metal watchband. Some of the parts of the band looked familiar: the base of an LED lead there, a strip of black insulation there. All of it was soldered together, and pits in the solder seam beneath him seemed to account for the source of the solder.

He extended a pair of probes. Just as he'd thought. On the other side of the wristband, the red cable was dead.

There has to be some explanation for this, Kevin thought. He swiveled the bot's eye back and forth, feeling as if he were being watched. This was just too weird.

A yellow light blinked insistently in his goggles. The bot's stored charge was one-quarter depleted. He'd better get on with this job before he lost another bot. His insurance was high enough as it was.

Cut the watchband, he thought. That was the obvious move. But something made him hesitate. Better to play it safe. Better to go on into the

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assembly, check it out internally before restoring power to the area. He'd never come up against anything like this. Yeah. Better to play it safe.

Darkness engulfed the bot as Kevin moved forward into the trouble area. He wanted to conserve power; but there was no choice, he had to keep the headlights on high beam. The silicon city around him was deserted, ghostly in its stillness.

Spooky.

"That's odd," Kevin muttered. Chip 47 loomed ahead of him, and there was something badly wrong with it. The leads were all intact, but about half the chip itself was *gone*. There was nothing neat about it, either, like you'd expect from a factory defect or a burnout. It had a fuzzy look, like something had taken a million tiny bites out of the casing. Inside, thin strands of something silvery had been woven in a not-quite-random pattern between the chip's remaining internal components.

Kevin edged closer. Something seemed to be holding him back. He steadied the bot, rolled a little closer, stopped. Fear. It was fear that held him back. He'd seen it all. He'd diagnosed and repaired everything that a human could do to a piece of electronic equipment or that the equipment could do to itself. This was different. This was . . .

"Crazy," he muttered. "It's crazy. But I ain't afraid of nothing. If it's electronic, I can get to the bottom of it."

Distantly, a whispering voice was trying to speak to him, and closer to home, the bot's power readout was nearing the half-depleted mark. He ignored both and moved up as close as he could to chip 47.

Yes, the spaghetti tangle of microfilaments had a design to it. There were thousands of them! And he could see where some of them exited the chip entirely, connecting it to other nearby components. He probed one of the filaments—or tried to. The outer coating read as a nonconductor, and the material resisted his bot's microdrill. Analysis showed its chemical makeup consistent with elements readily available inside the VCR, but in the form of an alloy he'd never seen before.

He backed off. The explanation that kept bubbling to the surface of his mind was too incredible to believe. But how could he deny what he saw with his own eyes?

I'll tour the whole assembly, record what I see, and get out with reserve power, Kevin told himself. Later, he could analyze the data and try to figure out what the rewired components would actually *do*. Already, he had a sneaking suspicion. It *was* the signal recognition assembly, after all. Any alteration to it might enable it to decode signals other than those the equipment had been designed to receive. And with the satellite dish out back . . .

Kevin froze. The shadow of his bot had suddenly sprung into being directly ahead of him. The shadow was growing larger. He whirled the bot around. White light blinded him until he had the presence of mind to snap the filter down over his bot's eye. That was when he saw the cylindrical object moving slowly toward him.

"Well, slap my butt and call me a bastard."

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The thing was a bot, no doubt about that. It was about half the size of his repair bot, and the thickening near the top hinted at a powerful onboard computer wired at the molecular level. The body itself was smooth except for a number of oval-shaped indentations, and the whole thing was levitating over the solder seam.

He ran a recognition check, just for grins. There was no record of any bot anything like this one in the entire MBSI catalog. It might be an experimental government device, new and secret, but what the hell would it be doing inside Mr. Walter Meekly's VCR? Besides, it looked light-years beyond anything Kevin knew about. . . .

The strange bot dimmed its headlight, as if sensing Kevin's discomfort. Kevin lifted the filter. The bot was moving in a slow circle that ended up putting it directly between Kevin's bot and the modified chip he'd been examining.

"Message received," Kevin whispered. He folded his manipulators into the down position and backed up a bit, just to show it he was no threat. The other bot didn't move. Who was controlling that thing? There wasn't the sort of antenna that every bot he'd ever heard of needed to receive its VR control signal. But its responses to his actions were lightning-quick. He remembered how it had eluded him the first two times he'd spotted it.

"Autonomous," he said out loud. "Must be." What a breakthrough! NASA was still having trouble putting smart computers into their space probes. And those things were *huge*.

"Oh my God."

It all became clear to him so suddenly, so completely, that he knew he was right. Then, as if he needed further proof, the Unidentified Microrobotic Object hovered nearer. One of the oval indentations opened, and a tiny needle-shaped manipulator darted out. Kevin started to back away, but then he realized the extrusion wasn't a weapon. It was a writing implement. The UMO was moving it in quick jerks across the solder surface beneath them.

First contact, Kevin thought. Make that first *nano*contact. And *he* was the contactee.

The UMO had finished, retracting the needle back inside itself. Kevin rolled forward, suddenly conscious of how crude his own bot felt by comparison. He peered down at the solder. Nothing. Not even a scratch.

He looked at the UMO. It seemed to be waiting expectantly for something. Kevin looked back down. The solder appeared unmarred. But what if . . .

He zoomed in, full mag, and focused his headlights on the area the UMO had concerned itself with. And there it was! A design was visible, the scaling so small that the image was blurry even to his microbot's tiny eyes—which meant it was *very* small.

"Weird."

He crept up a bit, mindful of the alien bot's watchful posture, and peered down at the message. The design consisted of two circles. One of them, oddly familiar, held eight other concentric circles inside it. A line connected the third ring from center with the outer ring of the second cir-

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cle, which held four more concentric circles.

"I get it. You come from a solar system with five planets."

A voice, far off, replied, "What the devil are you talking about? The kickoff's in five minutes!"

Oh, hell, thought Kevin. *Better be careful about that.* Because a plan was already forming in his mind, and that plan didn't include anyone else finding out about this—especially Mr. Walter Meekly.

He stared at the bot, wishing he could reply to the message. His own bot, unfortunately, was entirely incapable of manipulating structures that small. He could write larger, of course. But what would he say?

Two red lights were flashing in his goggles now. He had barely enough power to make it out of the VCR. One final glance at the bot. It was looking at him, but somehow Kevin thought its mind was occupied with something else. It seemed impatient.

"Sorry, pal," he whispered. "Gotta run." He pivoted his bot back toward the VCR's air vent. Pausing, he added in his thoughts: *But I'll be back.*

"You want to *what?*"

Mr. Meekly didn't seem too happy that the game was already underway and his VCR wasn't taping.

"Sorry," Kevin said, his goggles now hanging limply around his neck as he chomped on his gum and tried to look casual. "It's fried in there. Total burn-out. It'd cost you more to rebuild it than to buy a new one. But like I said, I *will* buy it off you for twenty bucks. I can use the casing, and one or two components look like they might be salvageable."

Meekly's red complexion didn't look like it was doing much for his blood pressure.

"But your advertisement says . . ."

Kevin shrugged, started packing his away his gear. "Whatever. Look, I gotta couple more calls to make, and it's getting late."

"Wait."

Sucker.

"Twenty dollars?"

"Yep. That's the offer."

Meekly hesitated. "Well, it's nothing but junk to me now. All right." He started disconnecting the VCR, and Kevin dug into the pocket of his jeans until he found a ten, a five, and five ones.

"What about the game?" Meekly asked as Kevin stood in the doorway.

Kevin smiled. "Tell your friends there's always radio."

On the way back to the trailer, the old white van bogging down as usual (he'd have to change that fuel filter one of these days), Kevin worked the whole thing out in his mind.

An alien race wanted to make contact with Earth. They'd been picking up our signals for decades, but every time they sent a signal *our* way, bomp, it vanished. No reply. So they figured we weren't listening, or if we were, we were looking the wrong way with the wrong equipment tuned to the wrong frequency.

Now these aliens were a little more advanced than us. Maybe a lot more. They'd honed nanotechnology to a fine art. It'd be easy for them to get a

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probe up to relativistic velocities if it was tinier than a grain of sand. And it was so smart, wherever it landed, it would find a way to let us know we were being bombarded by extraterrestrial signals every second and were just too dumb to tune into them.

(The van shimmied through a curve. Have to get those shocks fixed, Kevin thought.)

So. Mr. Meekly's VCR. Good a place as any, though it seemed kinda lucky the probe landed there, with the satellite dish and everything, when most of the world was cable-ready and the airwaves weren't used that much anymore. Still, these were smart ETs. Maybe the probe had some way of homing in on a likely spot like that. Maybe they were self-replicating and there were thousands—*millions*—of them. But then everyone would be turning up with omniscient toaster-ovens and blenders with bad attitudes. It didn't make sense. Could he really be the only one?

The van squealed to a stop in the driveway. Have to get those brakes adjusted, Kevin thought. But if this worked out half as good as he hoped it might, hell, he'd ditch the van and buy something really nice. Like maybe a private jet.

"Uh-huh. There. And that should do it."

The setup wasn't as pretty as Meekly's, but Kevin thought it would do the job. On the input side: an old dish antenna he'd accepted as payment once and promptly plopped in back of the trailer, where its main function was to give the poison ivy something to grow over. On the output: his IBM-clone PC, wired in with a splice-up job even he wasn't sure how he'd rigged. And there, in the middle of it all, the heart of the system: Mr. Meekly's VCR.

"OK, baby. Show me what you've got."

He turned on the PC first, then the VCR. Nothing happened. The monitor said SYSTEM ON-LINE, but there was no data coming in. Maybe the little UMO had failed in its mission. Maybe the VCR hadn't contained the components it needed. Maybe—

"Aha!"

The numbers didn't mean much at first, until Kevin realized that one set was in degrees and minutes and the other was a measure of time. Then he knew, and it took only a few minutes to align the satellite dish to the celestial coordinates.

"Bingo."

It began. Menus first. Then submenus. Information started scrolling by so fast he could barely read it. It was in English, though, which settled a concern he'd had ever since the plan dawned on him. And some of the file names intrigued him greatly: POWER.TEK, CURES.DNA, PEACE.WPS, HITECH.DBS. They were giving it all to him! And there was so *much* of it. Once the hard drive was full, he went to floppies. Then more floppies.

"I don't *believe* this!"

More files, thick with data: C+.TEK, TIME.WPS, GENTEK.DNA, MMORT.DNA. The human race was in for some changes, and he, Kevin Mitchell Conrad, was the key. *He* had the data. *He* could save the world. And *only* he

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could do it.

The answer had been hiding in one of the README files. It seemed the aliens *had* sent out self-replicators and there *were* millions of them. Only they'd been programmed to scan any contactee—probably a repair person—and only continue the contact process to completion if they found certain qualities in the contactee. Otherwise, they were to shut down—to commit suicide.

It didn't say anywhere what those certain qualities were.

Kevin didn't worry about it. Yes, he would save the world. For a price.

"That's right," Kevin said as he popped the top on a cold one and let the computer soak up whatever the ETs sent. "They'll pay for it—but not all at once. I'll give it to them one bit at a time. Maybe the stardrive this year, maybe the cancer cure next. Payment on delivery."

He laughed. He drank another beer. This was his ticket out of the rat race. No more VCR repairman. He would *be* somebody. And if the rest of the world didn't like the way he did business, screw them. Screw them all.

Something beeped at the computer station. Kevin looked up just in time to see the scrolling alien data freeze, hesitate, and then start running again. He leaned forward, not too concerned. Until the screen flickered and the scrolling alien data was replaced by a fractal screen-saver with the message WHEN ELECTRICIANS DO IT, WATCH OUT FOR THE SPARKS!!! Then the message broke up into tiny colored pyramids before, with a last flicker, the screen returned to the scrolling data.

"No," Kevin whispered. He opened a side window to run a diagnostic, but the system reported that it was overtaxed and could no longer perform multitasking.

"Shit!" Kevin hissed. He checked the diskette drive and found it nearing capacity. He checked the diskette supply and found it exhausted.

"Fuck," Kevin sighed.

Then, like that wasn't enough, the scrolling data was interrupted again, this time by a message in flashing crimson letters.

TRANSMISSION ANGLE SHIFTING. COMMUNICATIONS LOCK THREATENED.

Kevin repeated his last three utterances, three times in rapid succession, and then he picked up the keyboard and thumped it against his forehead. The ESC key hit him in the right eye, and when he dropped the keyboard to clutch at his face, he heard it clatter down with some force atop Mr. Meekly's VCR.

Which gave him the idea.

It would have to be right, and it would have to be *now*. There wouldn't be room for any screwups. And even then there was no reason to assume it would work.

SIGNAL DEGRADED SIXTEEN PERCENT, the crimson letters blared. SIGNAL LOSS IN THIRTEEN MINUTES.

Kevin hissed. They were giving up on us. They'd tried everything and gotten no response, and now they were moving on, turning their great searchlight away from Earth and probing among other constellations. He'd had his chance and blown it. Unless . . .

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It took Kevin only two minutes to disconnect Meekly's VCR from the system, remove the casing, and place it on top of the computer's CPU, the casing of which he had also removed. After that he could only sit back and watch. He stared at the exposed circuitry. Nothing moved in that gallium and silicon jungle, but Kevin knew better than to expect any outward sign. If the alien microbot possessed the intelligence he suspected, surely it would detect the problem and do something before it was too late.

TEN MINUTES TO SIGNAL LOSS.

Kevin shuddered. He'd gotten a lot, but he knew there was so much more to come. What would be lost if they broke contact before his machine could absorb the rest of the data? What if there was a final sequence that would activate all the others, without which everything he had recorded would be useless?

Nothing seemed to be happening in the CPU.

NINE MINUTES TO SIGNAL LOSS.

Kevin felt completely helpless waiting there for the alien nanoengineer to do something to save his butt. Then he spotted his repair case on the shelf by the door where he always left it. He knew at once what he had to do.

He got up from the computer and fetched the case.

Then he got small.

Inside Meekly's VCR, roaming through ghostly circuits spun like cobwebs from the ruins of some once-great city. Solder highways stretching between component nodes, strangely devoid of traffic. Nothing moving anywhere. Kevin wished for intrusive senses—an electron scanner would be nice about now. But that stuff was years away, and he knew he'd never be able to afford it even when they did figure out how to make it small enough to fit on a bot.

"Good ol' Model 1411-C," he muttered, somewhere far away. It was what it was: a repair bot. Equipped with the senses and tools it needed for that job—nothing more and nothing less.

Visible light would have to do.

Kevin raced over the motherboard, watching every angle for something that wasn't supposed to be there. He felt entirely too conscious of the seconds ticking by, of all that hung in the balance if he wasn't fast enough.

And then he found it.

He closed in on the object quickly, risking bumpy leaps over solder speed-bumps and taking shortcuts across printed circuits that would have fried him in an instant if power had decided to pass through them while he was traveling.

There, hovering in the shadow of that transformer. Sleeping, by the looks of it, silent. Floating like a boat at its mooring. Kevin wondered if it was dreaming. Or if it had decided to commit suicide after all.

SIX MINUTES TO SIGNAL LOSS.

"Time for your wake-up call," he heard himself say, in the big world.

He charged the alien bot.

It woke up fast.

First it leapt at least a centimeter into the air, then it circled him ten times at such dazzling speed that it almost snapped Kevin out of his remote senses. Then it hovered in front of him for

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five seconds and squawked at him.

Kevin blinked. The bot raced away so fast he lost sight of it in seconds. Pursuit would be pointless. It was faster than he was, and it had rebuilt the VCR into such a labyrinthine construction that Kevin would never find his way out again if he went into it. There was only one consolation, he thought as he followed his marked trail back out of the VCR.

The alien bot had been moving in the direction of his computer's CPU.

Three minutes later, Kevin smiled. It took that long to get out of the gear, get his real-world senses back, and watch the components of the Octium-9000 PC seem to liquefy before taking on new, disturbing shapes. Connections divided, multiplying into a vast spiderweb of finely spun silver.

TWO MINUTES TO SIGNAL LOSS, the monitor shrieked.

The hard-drive was clicking like a castanet player on methamphetamine. Kevin could never know if the bot had finished its upgrade, if the reconfigured computer could absorb all the data in time. For all he knew the thing would blow up first. Then he would have lost it all. He'd be condemned to a lifetime of fixing the VCRs of an endless succession of Mr. Meeklys.

Kevin shuddered.

ONE MINUTE TO SIGNAL LOSS.

He hit the PWR button.

Then he drank a six-pack and went to sleep.

In the dream he was chasing the members of an all-female punk rock band who had promised him sex if he fixed their PA system but then reneged on the deal. Just as he caught them, they morphed into alien microbots and spun all around him, squawking.

He woke up with a headache.

"I need a beer," Kevin muttered, smacking his lips and rubbing his eyes. Things were always blurry the morning after, which was every morning these days, but this time it all seemed wrong. Kevin blinked, trying to focus. The clock had been replaced by a large triangular panel of flashing lights: green, blue, amber, and red. Hell, the whole *room* looked different.

Kevin sprang out of bed. The floor felt softly cushioned, warm; the floorboards didn't squeak. And the air smelled strangely . . . clean.

"Make that a whiskey," Kevin whispered. He moved to the bedroom door and looked down the hallway.

Only it wasn't the hallway anymore. It was a corridor of light leading to something that looked like the control center of a nuclear submarine.

"Radical!"

Kevin ran down the corridor to what had once been the living room, and his breath left him in one long sigh. It was all different, remade. The furniture was gone, the walls pulsed with light, the kitchen glittered sleek and shiny. There weren't even any dirty dishes.

"Is this witchcraft, or what?"

The instruments that lined every wall gave no clue to their function, but Kevin noticed readouts at eye level, controls designed for human hands. The big screen that filled the entire northern wall had information

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appearing here and there for a few seconds and vanishing. It was in *English*. The wall cycled through three modes every few seconds. Invisible, it let him look out on the driveway where the van sat, leaking oil as usual. Then, for an instant, a wall—curving inward and ribbed. Then, again, transient blocks of text against a background he hadn't noticed before, a pattern of colors swirling in a lazy spiral. The longer Kevin looked at the wall one way, the more it kept staying that way.

Now the spiraling colors were making his eyes do funny things, and he found himself walking toward one of the stations. Only vaguely was he aware of sitting down on the built-in stool (which just happened to be the right height), and only distantly did he notice when an octagonal opening above him started sprouting multicolored snakes that quested downward until they found his head.

"Where am I?"

Around him, swirling blue clouds of light flashed arcs of color between one another in brief bursts and in sequences that hinted at meaning. Kevin couldn't feel his body. It wasn't like VR—he felt disembodied, not even conscious of a virtual self. His consciousness only floated, taking in the strange living sphere of color.

[The pattern is familiar.]

Kevin shook his head. That voice seemed to come from nowhere, from everywhere, even from inside him.

"Who are you? What is this shit?"

The blue clouds turned yellow. They weren't so much clouds, he noticed now, as intricate crystalline structures, feather-light. One seemed to be drawing nearer to him. . . .

Kevin felt his heart racing, his urge to flee suddenly unbearable. But all the while, a calm inner voice soothed him, assured him he was safe, lulled him and pulled, ever so gently, at some part of him.

[We have seen it before. We know which sequence to employ.]

The crystalline cloud had grown to fill his view, revealing all its intricate structure. Now, closer, he saw that all its tiny angular parts were moving. Some were opening out a cavity in the center of the vast structure, and Kevin suddenly realized it was this opening toward which he was being pulled.

I'm dreaming this, he thought. Like one of those nightmares you can't wake up from even when you know it's a dream. He tried to visualize his body, sitting there on that alien stool in what had once been the kitchen of his mobile home. He could *see* it, almost feel it. He slipped into the familiar trance, like when he was controlling a bot and the sensory shutdown failed and he had to get out the old-fashioned way. Concentrate. Pull back from the illusion and seek the real touch of living flesh.

[You must allow us to continue. Our operation enters a dangerous phase.]

"Who's we? You still haven't told me."

[Call me Mind, Group 3. I am 1 percent of each of us.]

There, he moved his finger. Concentrate. Focus. His whole body felt numb, but he could see it, somehow,

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beneath him.

"Well, Mind, Group 3, I'm Kevin Mitchell Conrad, VCR Repairman. You know, I may be a little behind the times, but I've never seen a setup like this in my life. What's it all run on—batteries?"

[Batteries?]

"You know, where do you guys get the juice for all this?"

He could almost *feel* Mind thinking. Good. Keep it occupied. Divert its attention while you . . . what?

[Energy is abundant on the micro level, its release to the macro a simple exercise in translation.]

"Isn't there, like, a law against that or something? I mean, what is it? Cold fusion?"

[Nothing so primitive. Haven't you read the POWER.TEK file?]

"Haven't had time just yet. It's on the top ten list, though."

Cheap, plentiful energy. Operations that produced more energy than they consumed. Kevin knew he'd probably never understand it. He also knew that this single item, even if he got nothing else out of the deal, would make him the richest man on Earth.

[We have searched for the right conduit. Your cooperation is essential to our group's success.]

But only if he got the upper hand. Yes, remember it's in your mind, trying to pull you in, brainwash you, make you its puppet. Focus on physical sensation. Rough fabric beneath the fingertips. Something cold and slippery tingling over the head.

Kevin opened his eyes.

[We will gentle you. It will ease your discomfort and quiet your struggles.]

"Like hell you will," Kevin said. With all his willpower, all his hatred for the control others always seemed to hold over him, he told his hand to reach up to his head. What felt like wet snakes writhing in his fingers were really shapeshifting nanotechnic probes. When he swatted at them, they recoiled, melting into shorter, stubbier shapes, and finally retracted into something that looked like a shower head.

"And my worst worry used to be the fucking fuse box," Kevin grumbled. He thought he saw the shower head move, so he got up from the stool and backed toward the door.

There was a table near the center of what had once been the living room. Three metal objects sat there: a black triangle, a red and silver egg, and something that looked like a potato peeler with a row of buttons on its handle. Kevin grabbed the last of these and jammed it into the front of his pants. A plan was already forming. A plan that would make his earlier ambitions seem timid by comparison.

The door didn't open—he just walked through it. His skin tingled all over, there was a popping sound, and then he stood on the familiar wooden deck. He turned around (the floorboards squeaked comfortingly) and looked back at the trailer. From the outside, it looked exactly the same as always. Ugly. Beautiful. *Normal.*

The van started on the third try.

"Does it really matter, Max?" Kevin twisted his cap to the side, winked at the girl. When she wasn't working part-time at Rascal's Pawn shop, Max-

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ine was busy cultivating her contacts at the local research and development firm. Now, her elfin features taut with concentration, she looked down at the object he had given her.

"What's it do, then? If you won't tell me where you got it, at least tell me *some*thing. It looks like an electric potato peeler."

Kevin smiled. He'd usually flirt when he came here to pawn one of his tools for beer money, make the standard remarks, like it got him anywhere. But today, his excitement came from a different source.

"Press the red button," he said.

Max did.

Then she dropped it onto the counter and squealed like she'd seen a mouse. "It's . . . it's a screwdriver now."

"Duh," said Kevin, smiling. He searched his pockets for a stick of gum, came up empty.

Max squinted at him. "Kevin Mitchell Conrad, what the hell have you gotten into?"

Something in her tone argued caution, but to Kevin—in the microworld or the macro—caution was for wimps.

"Hey," he said, laughing, "it's just something I whipped up in my garage."

"You live in a rat-hole of a trailer. There's no garage."

"Figure of speech. Look, Maxi, it's kind of secret—you know, moose and squirrel stuff. You got any gum?"

"It pulls your fillings out. I'll give you a hundred bucks."

Now Max was playing with the gadget, turning it from a soldering iron to a laser, from a crescent wrench into a tool with a vibrating silver coil at the end. Kevin knew from his own experiments that the shape-shifting tool could become anything its user wished it to be.

But hell, the rent was overdue. And he *did* need beer money.

"Two hundred," he said.

Max laughed. Damn, she had a bod. Kevin stood up a bit straighter, pulled up his tool belt so only half his butt was hanging out of his jeans.

"One fifty. Not a penny more."

After that, he stopped at the Quickie Shack and bought a twelve-pack of longnecks. Then he stopped at Roy's and bought everyone a drink.

Back home, buzzing, whistling, happy. Home sweet home. Up the steps to the door. OK, up the steps again. Damn, that hurt. All keys look alike in the dark. Quick snooze, leaning up against the door.

Falling through . . .

"Whadahell," Kevin sputtered, rolling up onto his knees. When he reached back and pressed at the place he'd just fallen through, it felt solid and slightly warm.

He threw up.

The vomit vanished into the floor.

Quiet. Only the hum of instruments and the whirring of fans. He noticed what looked at first like houseplants in a window box running the length of the wall. When he drew nearer, he could taste the fresh, oxygenated air. The ol' trailer had never even had AC.

His head throbbed, but the glittering lights and the crisp cool air brought him partially back to reality. He looked around slowly.

Some kind of microbots—maybe

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even nanites—had been at work during his absence. Some of the assemblies he'd noticed before were gone or had reconfigured themselves. As he moved around the trailer, Kevin began to feel uneasy about all this. The floor, walls and ceiling, all composed of interlocking nanites, their limbs firmly clasped together. As easily as they could become inanimate segments of the floor, they could become voracious consumers of human flesh.

Kevin whistled into the shadows. It felt . . . wrong in here somehow. Like the time he'd surprised that burglar. Kevin touched his leg, where you could still see the scar of the bullet hole. He backed slowly toward the door.

Something *was* there, deep in the shadows in what had once been the spare bedroom but now more closely resembled a giant spider's den. Something big, some trace of movement. . . .

Kevin turned and bolted through the door. Someone punched him in the nose, and he was on his back before he realized the door hadn't let him through. He stood up and put his hand against it. Solid. Quivering slightly with the aftershock of his impact.

"OK," he said, lowering his head. "You got me."

"We got you," said someone with a really strange voice.

Kevin looked up.

"Well feed me kitty litter and call me puss."

It was cylindrical, silvery with a widening near the top, big enough to fill a quarter of the room. It was hovering about a foot off the floor.

"You . . ." Kevin hissed. His mind snapped back into clear, sober focus. Yes, it was the same as the microbot he'd encountered in Mr. Meekly's VCR.

Only this was its big brother.

"Well, I've met Mind. I guess you're 'Body.'" Kevin was terrified, but it seemed important not to let the macrobot know that.

"I am Appendage 2."

"Pleased to meet you. I'm Kevin."

The bot dipped lower. "Kevin," it said, "please view."

A hologram leapt into the air in front of him. Kevin watched as he, his very own self, picked up the potato peeler from the table and stuck it in his pants.

The hologram vanished.

"Yeah, well, I can ex—"

The macrobot darted forward with surprising speed and zapped Kevin with something that felt like a hundred cattle prods.

"Hey! You son of a bitch!"

"Son of a bitch!"

"Who you calling a son of a bitch?" Kevin glared at the bot. Appendage 2 had a row of eyes around the top, like multicolored glowing crystal balls, and it rotated slowly around its vertical axis. He tried to hold its gaze while he slipped a hand toward the table, where there now rested another device, one that looked like a spherical TV remote control.

"Unacceptable!" Appendage 2 blared, shocking him again. As Kevin recoiled, he saw the remote control gizmo start to shimmer and then just vanish, absorbed into the material of the table.

"Message received," Kevin grum-

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bled. His fingers were numb.

"Communicate," said the big bad bot.

Kevin watched as it drew nearer, looming over him, pushing him into the control center, back toward that station he dreaded, back onto that stool that was just the right height. Back with things squirming down from the ceiling and into his head.

Immersion in the Mind of the machine. "Is this VR?" asked a voice, perhaps his own.

[You are within us. You are linked to the collective Mind of us all.]

Images cascaded across his awareness: great armadas, whole star systems digested and rebuilt into gleaming metal and crystalline constructions. A civilization spreading across the stars, probing ever outward along its expanding perimeter.

[We have found only four others,] someone said in this mind.

"Four . . ."

[We work in better harmony if adjustments are made. You were selected for a reason.]

"What reason?" he heard a voice just like his own say, somewhere very far away.

[Unimportant. We erred. We should not have chosen you.]

"Get off."

[Nevertheless, we see in you potential.]

Kevin felt things moving in his head, the tingle of nanotechnic fingers stroking his neurons. Pressures released. Primitive instincts decreased in force. The usual appetites faded.

"Will I stay like this?" he asked, now fully aware of his body at the station, of his brain physically linked to the great nanomind from the stars.

[If we choose.]

Kevin was about to ask just who the hell they thought they were when he noticed flashing lights through the now-transparent front wall. Several cars had pulled into the yard, blocking the van and the street. He heard car doors slamming.

[We feared this.]

Again, the recorded image of his theft, only now it included the sale to Maxine.

"You were watching me even then?"

[You carried an appendage inside you. Obviously, your kind cannot be trusted.]

Heavy knocks on the door. Through the wall, Kevin saw men in black coveralls taking up positions all around the trailer. A couple were searching the van. Most of them carried handguns; a few carried rifles.

"What is this?"

[You have attracted attention. We hope you will learn from this encounter.]

"Learn? What's to learn? We're dead."

[We never die.]

And then, abruptly, the nanofingers withdrew from his head. Kevin blinked at the new clarity of everything.

Pounding, now, from both the front door and the back. He could see one of the men talking into a megaphone, but absolutely no sound penetrated the wall. (It was vibrating on that side, just a little.)

"I wish I could hear what—"

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"OPEN UP IN THE NAME OF THE LAW!"

Kevin's heart started thumping, but then something overcame him, a calm assurance he had never felt before. His forehead tingled. He walked to the door.

Reached for the knob.

Turned it.

"Can I help you?" he asked, stepping quickly out onto the deck and closing the door. He noticed the knob felt warm in his fingers.

"Are you Kevin Mitchell Conrad?" asked a black-uniformed man with wraparound sunglasses and an automatic weapon.

"Yeah," he said, raising his hands. "And I'm unarmed. Guys, you're making me nervous."

The cop, if that was what he was, didn't move. Kevin noticed the half-moon insignia on the man's sleeve. That wasn't like any law enforcement uniform he'd ever seen, and he'd seen most of them.

Then the man behind him moved, and Kevin saw a hand come up. There was a click, a swish of air, and something missed his head by an inch. Kevin leapt right through the door and back into the trailer. When he looked up, expecting to see the feds coming through behind him, he saw them walk into the wall and bounce off instead.

But the feds weren't giving up so easily. They tried shooting at the lock. The trailer absorbed the bullets, making their stuff its own. They tried ramming the door with one of their cars. The wall vibrated, ringing the trailer like a bell, but Kevin felt only the mildest tremor beneath his feet. Then one of the consoles beeped and the fed's car stalled.

He was already daydreaming of his own secret island resort—daydreaming more specifically about the scantily clad maidens who would grace the beaches of his own secret island resort—when two things happened.

A detector in the wall started flashing red and screaming approximately the same color.

And Kevin saw, through the transparent wall, two of the black coverall guys depositing something against the front door.

The something exploded.

Kevin screamed, tumbling to the floor. The wall had gone opaque, the whole trailer undulating as every surface shimmered and reformed before his eyes, losing focus, then gradually returning to solidity. The wall slowly cleared until it was again transparent.

The men were bringing another something to the door.

"We gotta get out of here!"

Kevin's eyes lit on the Mind station. Hesitantly, he approached. Another explosion knocked him to his knees. A globe hanging from the ceiling started warning about all kinds of impending catastrophes.

Kevin sat on the stool and let the snakes into his head.

[Understood,] came the instant response. [We know what must be done.]

The trailer shuddered, its outer skin convulsing, reforming itself—but into what, Kevin couldn't see. He felt a faint vibration through his feet. Then a not so faint vibration. The muddy ground

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outside the trailer started rising.

"Well kick me in the head and call me a crash test dummy."

A trio of red lights started flashing, and a whining like the teeth of hell came from directly under his feet. The floor dropped. It felt just like being in an elevator.

When Kevin looked out the window, his mouth fell so far open that his gum tumbled out onto the floor.

Pulverized rock, glowing ember-red, swept past the windows. The trailer leveled off at five hundred feet below ground. Occasionally there would be a bump or lurch, but for the most part the ride was smooth.

Kevin had one memory he would always cherish: the dumbfounded black coverall guys looking down into the hole, their faces bloodless, white.

After that, remote cameras provided the only view of the world above ground. Kevin had disentangled himself from Mind—easier now with practice, so his only sources of input were those monitors and the instruments that delineated the trailer's configuration and performance as it burrowed through the rock.

"Where's the energy for all this stuff coming from?" Kevin wondered aloud as he moved around the trailer—or what had *once* been the trailer. It was Gadget City now, every machine humming and flashing with power. He just didn't buy Mind's easy answer.

Until he went to the bathroom.

The bathroom wasn't the bathroom anymore. Behind the door, which appeared unchanged, a large black cylinder squatted. Transparent coils fed it from above, pumping what looked like molten metal into the top of it. Below, other coils carried away something darker, cooler. And a tiny chamber at the base seemed to be collecting small amounts of something from whatever was flowing through the coils.

Cables slithered out of the black cylinder's base, leading toward every part of the trailer.

Kevin scratched his head.

This must be where they did it, where they accomplished what Earth scientists still could not. Somewhere inside that cylinder, energy was being produced—enough energy to work all these changes, to alter every atom in the trailer. To move it through rock as easily as a submarine moved through water.

Fusion or witchcraft? Kevin shrugged. This was going to make him rich. He could hire a tutor to explain it to him afterward. Another question was beginning to bother him even more urgently.

"So, what if I have to take a dump?" he asked, slamming the bathroom door in disgust.

Appendage 2 came around twice, urging him to reconnect with Mind. Kevin refused. He meant to go on refusing.

"There's enough of you critters in my brain already," he told the big bot, which rotated one hundred and eighty degrees and moved away, looking sullen.

The trailer increased its speed and started moving in wide circles, as if searching for something. Kevin hardly noticed. Watching the remote views, he saw the swarms of uniforms—

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black coveralls now absent, replaced by blue and brown and even Army green—bustling about the edge of the crater where his mobile home had rested for six and a half years. It made him feel powerful, to be able to observe them without being observed, to know the answers to so many of the questions that burned in their minds.

But not *all* the answers.

The floor tilted again; ridges popped up beneath his feet, enabling him to keep his footing. The trailer churned downward through denser rock. For a while the ride was smooth, but then there came an increasing number of jarring impacts.

Then a final lurch, and silence.

Kevin's stomach surged up into his mouth as the trailer crashed into something hard. Kevin was propelled across the room and into a big balloon-like thing that suddenly appeared from nowhere. It softened the impact, and when the trailer came to rest at a thirty degree cant, Kevin wasted no time getting to the door.

Stepping outside . . .

Dank. A sharp, flinty odor hung in the air. Water dripped in the distance. The air felt cold, clammy.

"Light. I need light."

The trailer's deck light came on, brighter than it had ever been before. Around him, a subterranean cavern sprang out from the darkness, complete with stalactites and stalagmites and sparkling, quartz-encrusted walls.

"Megacool," said Kevin. He chomped on his gum, which tasted a little gritty since he'd picked it up off the floor.

"But what the hell are we *doing* here?" He walked off a few steps and turned back to look at the trailer. *Fleetjet 2000*, all the way. An old '92. In deplorable condition. It looked funny, sitting there on the wet cavern floor. But Kevin saw no sign of damage. In fact, it had already leveled itself.

He blinked. Something was happening around the trailer's underbelly. Things were dropping down to the cave floor—what they were, he couldn't tell. They moved, shimmering, and then the cave floor beneath the trailer took on a violet glow. The glow spread outward in an expanding ring, and everywhere it passed, the rock sprouted complex structures that gleamed with processed metal and flashed with electronic displays. Great chunks of the floor rose up, altering from raw stone into polished slabs of every shape and size and color. Stairs led up to these elevated structures, their steps perfectly shaped for human use.

[This will be our Centerplace,] a voice said in his mind. Kevin shook his head. He realized he already knew the answer.

Centerplace.

[This is where we are safe, where we come to rest. There is much to be done.]

Kevin tugged at his ear. "You asking me or telling me?"

[No compulsion is required. We wish to help your race advance without disturbance. You will be our conduit. You will act in the best interest of your race.]

"Did you ever think maybe I don't

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like my race that much?" Meekly. Taxes. Bills. Hell, what was he *saying?* This was his ticket out. Still, it wouldn't pay for *Mind* to know this.

"Look, I just get the funniest feeling you aren't telling me everything. Like why you're *really* doing all this. Like what you're getting out of it."

[As we said, we only want to help you—]

"Look, Bud, my race wasn't born yesterday, and neither was I. So give it up and tell me, or count me out."

Mind hesitated, which he found reassuring. Kevin had a feeling they'd be working with each other quite a lot in the years to come. It was nice to know he (she? it?) could be rattled.

[There is one slight benefit to us, should we succeed.]

Kevin sighed. "I knew it. What is it? Face-eating? You want to control our minds, steal our women? Train us to become your riding animals? What?"

[Nothing like that,] Mind said. [It was a contest.]

"A what? Did you say a *contest?*"

[The Allied Starfarers hold a competition every few of your millennia. The group to first locate, then contact, and finally advance to starfaring status any protointelligent species is the winner. I am Mind, Group 3. My group has advanced to Phase 2, the first to do so. We are only a few centuries from winning.]

"And what's the prize?" Kevin asked. "A trip to Disneyland?" *And who are you calling protointelligent?*

Again, a brief hesitation.

[The victor is held in the highest esteem. It's quite an ego boost, too.]

Kevin laughed, but then he stopped laughing. He was thinking about those contests where engineering students from Stanford and M.I.T. and such tried to make robots that could pick up plastic discs or brush a chipmunk's teeth at fifty paces. Could the aliens contacting him be the equivalent of college students?

But Kevin was thinking about something else, too. He was thinking about how obsessed, how driven some of those students could become.

Leverage.

"How do I know you'll play fair by me? And what makes you think I won't expose you, cause . . . disturbance? Then my society would collapse, not advance. And you'd lose the contest."

[You would not do such a thing.]

"You can't know that."

The Centerplace continued to take shape around him. Openings formed in the walls and ceiling, passages leading to new chambers the nanites were sculpting out of the rock even as he watched. For a long time, Mind remained silent. Kevin began to fear that he'd overplayed his hand when his forehead tingled and the voice of Mind spoke once again.

[What must we do to prove our good faith?]

The Centerplace gleamed around him—a castle, a sanctuary. But only a beginning.

Kevin smiled. "Now you're talking turkey," he said. Mind created a chair for him. Kevin sat. Chomping his gum, he thought about the rat race that had been his life, the urge for greatness that had never been fulfilled. What did he want? What did he

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really want, deep down? That secret island resort, yeah. Money, lots of money. And don't forget the girls.

Mind smiled.

"Maybe we're God's nanites," Kevin said, thinking aloud. "Maybe He sent us out into the machine of His creation, sent us out to fix all the little things that might go wrong." Kevin sighed. "Or maybe not. Could go either way."

Mind showed him glimpses of a future—a future that had a pleasing shape. No rat race. No scrabbling for dollars. No leaky gaskets or late payment notices.

And where VCRs had become totally obsolete. ■

IN TIMES TO COME

Our October issue has a stellar line-up, including Frederik Pohl, Marc Stiegler, Maya Kaathryn Bohnhoff, Jerry Oltion, Ben Bova, and artist Bob Eggleton. Eggleton's cover is for Pohl's three-part novel *O Pioneer!,* which pursues the associations suggested by the title in ways I've seen surprisingly seldom in science fiction. Picture a frontier world on which some (relatively) ordinary folks are just trying to make a living—but they belong to half a dozen wildly different species from roughly as many *other* worlds. You think that's easy? Fred, not surprisingly, generates a lot of both fun and thought as he explores the problems and possibilities. The October debut of this novel, by the way, marks the 60th anniversary of his first published pro sale, a poem in the October 1937 *Amazing.* Congratulations are in order for a long and truly distinguished career.

The other fiction includes another of Jerry Oltion's "Astral Astronaut" stories, a neatly convoluted tale of temporal tampering by Marc Stiegler, and a story by Maya Kaathryn Bohnhoff that may first irritate you into muttering, "But it isn't science fiction!" Ah, but it *is.* It gets right to the heart of how we know what we know—and bear in mind that every area of science was once too poorly understood to be "Science."

Ben Bova's fact article, on the other hand, deals with an area that is now quite well understood and widely applied—but his article, too, is very much about not just *what* we know, but how we learn it. In other words, how does research get done? Ben Bova spent one phase of his career very close to a project on the development of laser weapons, and gives us an inside look at how it happened there.

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J.G. Hemry

ONE SMA SPIN

Success? Failure?
It's all how you look at it. Right?

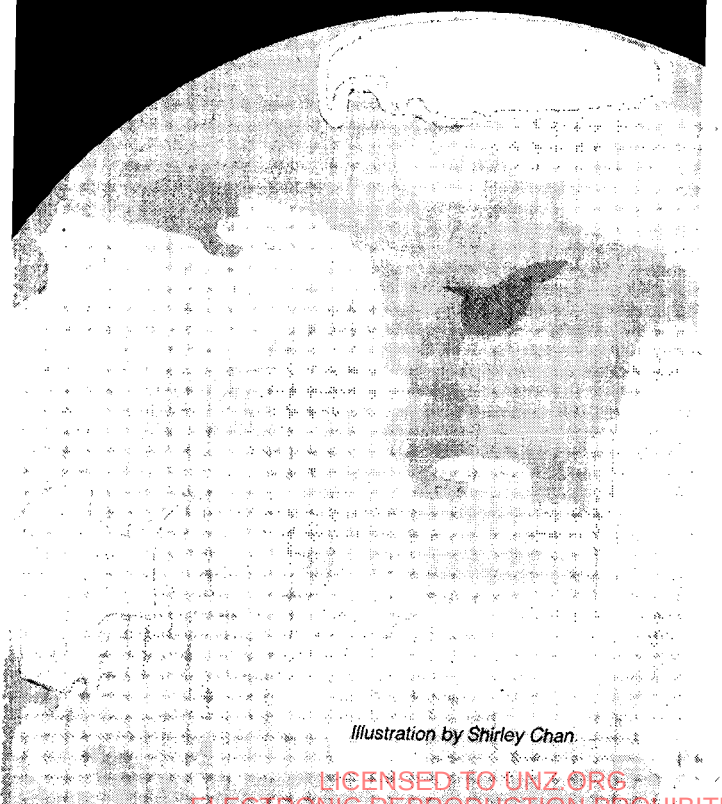

Illustration by Shirley Chan

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Cape Canaveral—NASA today announced the successful launch of Rover I, the first robotic interplanetary probe designed to fulfill NASA's mandate to explore the Cosmos using "smaller, faster, and cheaper" technology. Rover I will conduct an exploration of the surface of Mars, achieving the same goals as a manned mission at a fraction of the cost.

Rover I Landing Site, Mars—Rover I rattled away from the pad of its lander, six wheels spinning almost effortlessly in the weak gravity, leaving small rooster-tails of fine red dust in its wake. A video camera mounted high on the front swiveled back and forth to transmit a view of its path to observers eagerly awaiting the news on Earth. Encountering a small patch of boulders lying like carelessly abandoned playing pieces from some mighty game of Martian marbles, Rover I consulted its navigation programming, then turned ninety degrees and surged ahead once more toward a smooth patch of sand. Hitting the smooth patch, its wheels began spinning faster, hurling greater spumes of red powder into the thin atmosphere. Pivoting, Rover I succeeded only in digging itself deeper into the sandy depression, all six wheels now buried up to the hubs in Martian "quicksand." Halting at last, it sent a plaintive query back to Earth. Working across millions of kilometers, human technicians sent commands to rock back and forth, their efforts resulting in Rover I burying itself up to its axles in the soft red trap.

* * *

NASA Conference, Houston—

"There must be some way to free Rover I from that patch of dust."

"I'm afraid not, Doctor Singleton. We've tried everything, even using the sampling probes to dig in for leverage, but Rover I just got too deep into the fine sand to pull itself out unaided."

"Unaided? What sort of aid does it need?"

"Actually, a mild push would do the job, or a tug on an extended sampling arm."

"That doesn't do us any good."

"No, sir, but at least Rover I can examine the portion of the Martian surface within the radius of its sampling probes."

"How large an area is that?"

"About four square meters."

Talking Points, to accompany NASA Press Release—

Q. "How would you characterize the results of the Rover I mission?"

A. "As noted in the press release, Rover I performed in accordance with its design parameters. The robot landing vehicle has successfully conducted an extremely in-depth examination of a limited area of the surface of Mars."

Q. "Exactly how much of the surface has Rover I explored?"

A. "Since Rover I continues its activities, the exact area which has been exhaustively examined is naturally in flux."

Q. "If Rover I was such a success, why does Rover II need to be sent?"

A. "Rover I has only been able to examine a limited area. Rover II, by

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building on the experience of Rover I, will be able to cover a much larger portion of Mars."

Cape Canaveral—NASA announced that telemetry from the Rover II delivery vehicle indicates a successful soft landing on Mars. After conducting a series of self-checks, the robotic Rover II will continue the exploration of Mars begun by Rover I.

Mission Control, Houston—

"Oh, Geez."

"What?"

"Rover II's High-Gain Antenna won't deploy. It seems to be stuck."

"So punch it. Try rocking it with retract and deploy commands in series."

"I did. Whatever it's snagged on won't let go. We need a few more ounces of force."

"Where are we going to get a few more ounces of force on Mars?"

NASA Conference, Houston—

"Why can't Rover II function without the High-Gain Antenna deployed? Our space probes have been able to work using lower gain antennas as back-ups."

"Yes, Doctor Singleton, but a planetary probe is dealing with too many variables for low-gain antennas to work for control. Right now we can't tell what the attitude of Rover II is, or get anything approaching a video feed."

"So?"

"After Rover I got stuck, Administration insisted on positive control from Earth of all movement by Rover II. That means we have to use the camera to identify a clear path before we transmit a movement order."

"Listen, ladies and gentlemen, there's a lot of high-level interest in making the Rover program work, especially after all the money expended to date."

"We know that, Doctor Singleton. We think we've worked out a way to jar the High-Gain Antenna free. It should be relatively low-risk, and it's our only real option."

Mission Control, Houston—Commander Stan Halstead leaned over the control console, eyeing the readout dubiously. "Let me get this straight. You guys are going to deliberately crash Rover II into a rock?"

The console operator rolled his eyes at a companion manning the next console. "Astronauts. I thought you guys were scientists. Look, we need a couple of ounces of extra force to pop the High-Gain Antenna open, so we've identified a nearby rock formation and exactly calculated the necessary speed to achieve an impact that will deliver those ounces of force without damaging Rover II. Piece of cake."

Halstead shrugged. "I'll take your word for it. Personally, I'd have thought the extra variables would have made the problem too hard to work from here."

"What extra variables?"

"You know, planetary gravity and terrain. If Rover II's going uphill even a little, it'd be too slow to get enough impact, and if it's going downhill at all, it might go too fast and break something. With the High-Gain Antenna out, I'm amazed you were able to determine

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enough about the surrounding terrain to compensate for that."

"Uh, yeah."

Mars—Rolling sedately toward a large boulder, Rover II hit a steep slope four meters short of the target. Accelerating wildly, the probe struck the rock violently. The High-Gain Antenna popped free, whipping forward and slamming against the video-camera mount, which shorted out in a flurry of sparks. With debris from the shattered antenna lying across the power bus, Rover II's power cells overloaded and erupted into flame. Briefly, a small bonfire warmed the cold desolation of the Martian plain.

Cape Canaveral—The launch of a booster carrying Rover III, the latest in a series of robotic planetary explorers, was celebrated by NASA today. Rover III, following in the footsteps of the first two Rovers, will continue the awesome exploration of another world despite some controversy over the program here on Earth.

Senator Claghan, in a testy exchange with witnesses before her subcommittee, demanded to know how cost-effective the Rovers have been compared to a manned mission and inquired whether NASA was continuing to evaluate manned alternatives or was "fixated on the non-human option." NASA insisted that all alternatives remained on the table despite an official stance in favor of robotic exploration missions, and trumpeted the success of the robotic policy to date.

Doctor Singleton, senior NASA administrator in charge of the Rover program, noted that the Rover explorers have provided unprecedented information on the Red Planet. Rover II, he noted, elicited a remarkable level of detail on the difficulties of navigating through the rugged Martian terrain despite the unexpectedly short life of its power cells. When quizzed by Senator Claghan regarding the wisdom of dropping explorers into "rugged" terrain, Doctor Singleton announced that a different landing site with more promising terrain had been selected for Rover III.

Rover III Landing Site, Mars—Rocks ranging in size from clenched human fists to ones that rivaled the height and width of supermarket shopping carts littered the smooth plain. Coming down gently, the probe delivery vehicle landed slightly askew, propped on one of the smaller stones. Latches retracted, allowing clamshell doors to fall open with slow dignity, a fall that was halted prematurely when one section struck against one of the larger rocks. Inside the probe, Rover III spun its wheels impotently, unsuccessfully trying to climb out of its tiny prison.

NASA Conference, Houston—

"Only one door is stuck. Why won't the rest open?"

"Because they're all slaved together, Doctor Singleton. The idea was that the combined weight of the doors would make sure they all fell open."

"Why did we drop it into all those rocks?"

"They were too small to see from orbit. It looked like a smooth plain."

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"What can we do? We need answers, people!"

"Well, there's no way to open the doors enough for it to get out, but Rover III can see segments of the planet through gaps left by the doors when they partially opened. We think some of the sampling probes might be able to reach through the gaps and get some surface samples."

"So it's not a failure, then? Rover III can carry out its functions?"

"It can't go anywhere."

"But where it *is*, it can do everything, right?"

"Kind of like Rover I?"

"No, not like Rover I. This is a totally different situation. The landing vehicle suffered from a minor problem, but there's no failure on the part of Rover III. Am I wrong?"

"No, I guess not."

Senate Hearing Room, Washington, DC—

"If Rovers I, II, and III have been so successful, why is Rover IV needed, Doctor Bray, and where is Doctor Singleton?"

"I'm sorry, Senator Claghan, but Doctor Singleton had to remain at the Cape for final launch preparations. Senator, like any exploratory program, each mission can only accomplish so much. Exploring the New World required more than just Columbus's first voyage, and we've got literally an entire new world to discover here. The fact that much more remains to be found is no reflection on the undeniable achievements of the earlier Rovers."

"I'm a little vague on these 'undeniable achievements' you're citing, Doctor Bray. My staff has uncovered numerous complaints regarding the paucity of data produced by the Rovers."

"Senator, scientists are like little children when it comes to raw data: they always want more and they always want it now. I don't believe you'll find any scientist unwilling to admit that the Rovers have been responsible for producing unique and uniquely valuable information about Mars."

"I am willing to concede that, but must reiterate my concerns over the small amounts of that information. My staff estimates that, in toto, based on the data released to date the first three Rover missions have conducted in-depth examination of less than ten square meters of Mars."

"Senator, I can't imagine where that figure could have come from."

"Do you have a different one?"

"I'll have to check with Houston, but I'm certain we'll be able to provide a different number. As I'm sure you are aware, Rover III is still functioning so the amount of Mars being covered is constantly changing."

"I'd understood Rover III is immobile, Doctor Bray."

"I don't know where you got that information, Senator. I assure you, and I'd be prepared to assert this under oath, that Rover III's propulsive system is not now and never has been inoperative."

Rover IV Landing Site, Mars—

High in the sky, so deeply blue it hovered on the edge of black, a new light flared to life among the brilliant stars. Initially racing across the heavens, the

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light slowed, crawling to a halt, then began tracking in the other direction. Finally, the fiery beacon winked out, but soon afterwards another light appeared, growing in size rapidly as it hurtled toward the surface. Somewhere in the distance, the meteor struck with such force that Martian soil trembled briefly.

NASA Conference, Houston—

"What happened?"

"The retros fired on schedule, but they didn't shut down. We sent an override to make them halt, but by the time it got there their fuel had been expended. Apparently, not every retro burned out simultaneously, so the final spurts started a tumble in the probe. We can't be sure from here, but we think the result was that instead of kicking the landing vehicle into its planned trajectory, the prolonged burn ended up spinning it through the atmosphere at the wrong angle and too high a speed. The landing vehicle couldn't deploy and the whole thing hit the planet in a catastrophic impact."

"How could such a minor failure have wrecked the entire mission? Who failed here?"

"We're sorry, Doctor Singleton, but there was nothing else we could do. By the time we could see the problem and get a command back, it was too late. Even light-speed isn't fast enough to maintain positive control of a quickly moving situation that far off."

"'Sorry' is not an acceptable response. We cannot afford another, um, limited success. Period. There's too much visibility, too many questions being asked. The next mission *must* produce a wealth of results, or large portions of NASA's interplanetary exploration budget will be on the chopping block."

"Is it time to reconsider the entire programmatic approach, then?"

"What do you mean?"

"Doctor Singleton, every problem encountered by the Rovers to date on Mars would have been easily overcome by a human explorer on-scene. Perhaps a manned mission—"

"We are committed to the Rover *unmanned* exploration program. Understand? NASA cannot afford the expense of a manned mission."

"But the cost of *five* robotic missions—"

"And, I might add, there is nothing human explorers could do that the Rovers cannot. Robotic explorers carry all the scientific equipment human explorers could."

"But if the best way to explore Mars—"

"The best way to explore Mars, and every other planet in this system, was determined before the Rover program began. Robots are faster, cheaper, and better than manned programs. Every official evaluation since then has reconfirmed that finding. I know, because my office was responsible for producing those evaluations."

"Excuse me, Doctor Singleton. They assigned the Rover office responsibility for evaluating the success of the Rover program?"

"Of course. Who knows more about the program than we do? Now, I want a solid proposal for a means to ensure no limited successes like those

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we've encountered with Rovers I through IV."

"I told you. Send a human."

"You don't appear to be functioning as a team player. Perhaps you'd be more comfortable in the trans-URANUS probe development office. Yes, Doctor Bray?"

"There may be a way, sir, to avoid these problems without using a manned spacecraft. It's really just a matter of perspective."

NASA Conference Room, Cape Canaveral—

"I don't understand." Commander Halstead peered at the laptop computer screen with a quizzical frown, then back at Doctors Singleton and Bray. "This looks exactly like a scaled-down version of the preliminary spacecraft design for a manned mission to Mars."

Doctor Bray shook his head with a tight smile. "It's not. This is something else entirely."

"What?"

"It's a Forward-Deployable Maintenance Facility, or FODMAC for short."

"Huh?" Halstead jabbed one finger at the diagram. "Isn't that the lander?"

"No. That's an Individual Egress Module, or IEM. It's to be used only if maintenance activity on Rover V is required."

"Maintenance on Rover V?" Halstead questioned. "Does this mean the ship—"

"The FODMAC."

"—Is going to Mars?"

Doctor Singleton frowned and wagged one finger at Halstead. "No, no, no. Nothing in the FODMAC's mission statement has to do with going to Mars. The FODMAC will simply be required to maintain necessary proximity to Rover V to be able to conduct maintenance if essential."

Halstead let out a long breath. "Excuse me, but I take it I'm going to be the one manning the, uh, FODMAC?"

"No," Bray corrected gently. "You will be assigned to the FODMAC. The FODMAC is not defined as a manned vehicle."

"Even if there's a man inside?"

"Come now, Commander Halstead," Doctor Singleton chided. "Just because we work in this building doesn't make it a manned vehicle, does it?"

"Correct me if I'm wrong, but this building won't be going into orbit around Mars."

"Neither will the FODMAC," Singleton stated sharply. "An orbit is defined as the movement of a smaller body around a larger one. The FODMAC will always maintain a fixed position relative to Rover V or its landing site. It will *not,* therefore, ever be in orbit."

Halstead leaned backward, eyes shifting from one administrator to the other. "I am, however, an astronaut. Why do you need an astronaut to 'occupy' something that isn't a ship and isn't going to Mars?"

Bray cleared his throat and smiled again. "I see you haven't read your e-mail yet today."

"My e-mail?"

"Yes, if you had, you'd know that your job classification has been officially changed. You are no longer occupying an astronaut billet. Commander Halstead, you are now an

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On-scene Maintenance Technician."

"I see. What if I don't want to be an On-scene whatever?"

The two doctors exchanged glances. "In that event," Singleton advised, "you will of course be released from duty with NASA and returned to your parent military service for assignment. Naturally, the secrecy oaths you signed regarding classified mission details will remain fully effective, and any discussion of the FODMAC or your role in it will be forbidden. Alternatively, you can choose to participate, and have some role in this historic mission. The choice is yours."

Vicinity, Mars—

Commander Halstead shifted uncomfortably, trying for the millionth time to fully stretch in the small compartment that had been home for months. His head jerked as the communications panel buzzed to warn of an incoming message.

"FODMAC, this is Houston. Rover V has encountered difficulty deploying from the pad of the landing vehicle. Conduct an egress and carry out necessary maintenance."

Halstead's heart leaped. "Roger, Houston. I understand you desire I conduct a landing on Mars near the Rover."

Long minutes passed as light-waves crawled back and forth through the emptiness, before Houston's reply finally roared forth. "Negative, FODMAC! Negative! Your reply used improper and unauthorized terminology and has been purged from system records. We repeat, you are to conduct an egress using the IEM and achieve necessary proximity to Rover V to conduct any required maintenance, then return to the FODMAC ASAP. Do you understand?"

"Yeah, Houston, I understand."

A trail of footprints marked the Martian soil, leading from the still-smoking site of the IEM touchdown to the pad where Rover V sat like a huge, ugly stamen in the middle of a petal formed by access panels that had dropped open on every side. Halstead glared sourly down at the machine, noting that the retaining clip on the left rear quarter of the Rover had failed to release and was holding it captive. Pulling out a long screwdriver, he bent awkwardly, inserting the tool inside the latch and tugging. The latch popped open and retracted, freeing the Rover, which immediately surged into motion, seeming to bustle merrily away across the red landscape.

Commander Halstead trudged heavily back to the IEM, pausing at the ladder, then stared toward the glowing spot of light far above that marked Earth. "To hell with it," he muttered, then fished an oblong of stiff paper from the tool kit and smiled at it. One side of the postcard was given over to a picture of the American flag. On the blank side, Halstead had earlier written "KILROY WAS HERE" in large letters. Jamming the screwdriver blade through the paper next to the flag's union so that it served as a crude jackstaff, he planted the tool handle-first in the soil, then stepped back and sketched an elaborate salute. Leaving the tiny marker, he climbed back into the IEM.

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NASA Press Conference, Houston—"Ladies and Gentlemen, I am pleased to announce that the robotic probe Rover V is successfully completing every assigned task. Our knowledge of a wide area of the planet Mars is being significantly augmented with every passing hour as a result of the analytical and exploratory capabilities of Rover V. In short, this is an outstanding success for our planetary exploration program. Every person involved with the Rover program should be immensely proud, as should every American."

"Excuse me, Doctor Singleton, but rumors persist that a manned expedition was somehow integrated with the Rover program and played a role in this latest success. Can you comment on those rumors?"

"I do not know why this kind of irresponsible rumor-mongering continues to be given credence. This sort of innuendo has surfaced before and our comments are on record."

"Nonetheless, Doctor, can you categorically deny any manned involvement in the Rover program?"

"Sir, every line of the Rover mission plan, funding authorization, and mission objectives is available on-line for your review. Use any keywords you want to search through them. I can categorically state you will find no reference to a manned mission to Mars therein. Does anyone else have questions?"

"Doctor Singleton? There has been an ongoing dispute over the relative worth of manned missions versus robotic exploration, with partisans of human explorers insisting there is no substitute for human involvement given the inherent limitations of any machine and the huge distances involved in space travel. How does this success for the Rover program affect that debate?"

"We have not been involved in any 'debate,' as you characterize it. We were assigned the mission of achieving planetary exploration quickly and at minimum cost, using robotic explorers, and we have done so."

"But, Doctor, this is the fifth Rover mission. Counting the previous Rovers, the time spent designing them, building them, and in transit to Mars, as well as the costs of all those missions, wouldn't a single manned mission have been both faster and cheaper?"

"I can't speculate on such issues. Our orders were to conduct robotic exploration of Mars, and we have done so. I really can't understand why the press is trying to harp on the allegedly limited success of earlier Rover missions instead of the positive news of Rover V's accomplishments."

"Doctor Singleton, in light of what you've characterized as the Rover Program's overwhelming success, is there any foreseeable need for future manned missions outside of Earth orbit?"

"I would say the official record speaks for itself in that regard." ■

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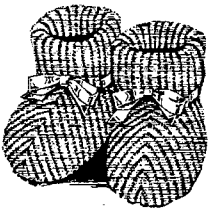
Fran Van Cleave

SECOND CHANCE

As a society evolves, it creates the need for new kinds of moral decisions—and they're seldom simple.



June 16, 2003—Midnight Friday

They—the ubiquitous they—say that when you're pregnant, you're supposed to glow. I picture myself, Gillian Blessing, overweight, tortoise-shell glasses, the blue-tinged skin of a true redhead, glowing like a UFO as I deliver the genius fruit of the womb.

So much for fantasy. Oh, the physical description is right on, but I'm the perfect opposite of glowing, and barring random mutations, the seed of Joel Slotkin will produce considerably short of genius.

Of course it's my fault. I'd pried myself away from science fiction for a while, on account of the fact that I'd just turned seventeen and could not find any Honest-to-God sexy romantic heroes in the whole genre, and believe me, I'd *looked*. To me, hard SF does not mean rivets.

Anyway, I ended up reading the *Autobiography of Benvenuto Cellini* (fabulous), writing wretched poetry (not fabulous), and hanging out at Paris Blue's Madderroot Teahouse.

Blue's is right across the mall from 2001 Books, where I work four days a week shelving audiobooks. What about those funny old paperback doohickies with the English hieroglyphics? Don't ask.

So a week later I had sex with this poetical blackjeans character I met at Blue's for the whole lusty sweaty-limbed experience of it. And we got

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carried away—that was the whole point, you understand—and the "pregnancy prevention device" broke. *Très* unromantic.

I'm still trying to decide if it was all worth the reciprocal experience of sitting here in the bathroom with that revolting pink rug on top of the toilet tank—Angie's idea, not mine—staring at this hideous purple line on my EPT and trying to decide what I'm going to do about journalism school. I decided that if I had to think about it this long, it wasn't. Worth it, I mean.

I've never been able to abide being around people who can't look on the bright side of things, but this is really dumping a virus in my cheerful program. College starts in sixty-three days, and I've already been accepted. To the mutual relief of both my foster mother and me, I graduated high school early and won a scholarship—only a thousand Newdollars, which is pathetic but still above average.

So for her next trick, the prodigy of Xavier Catholic High School goes down to the Reproductive Options and Empowerment Center with her fake IDENT and has an abortion. Lovely.

Or, I could sink to the lowest of the low, and auction off my embryo at one of those disgusting walk-in slavery shops that masquerade as a "Second Chance" for mother and child. Oh, don't get me started on those exploitive scum!

I don't believe in God—not the Catholic version—but in life itself, in all its mystical-pagan-terrifying beauty. Who could look at photos of the Great Nebula in Orion, with all those gorgeous baby stars, or the crystal glory of spilled Milky Ways on a summer night, and *not* feel a shudder of primitive awe?

Angie could, but the woman doesn't *look* at anything other than the markdown section at Nieman Marcus and the *TV Guide* crossword puzzle. But I digress.

Look, I know I have a complex about death on account of my father killing my mother when I was ten. She wouldn't give him a divorce, and that's about all I want to say about it. My shrink, Dr. Pangloss (Montero, actually, but he's in desperate need of a personality), is certain I've got this fragile self-image as a result. I do get awfully tired of explaining that my self-image is fine, thanks—it's just death I can't stand. I mean, I get upset when my tortie cat, Chairman Mao, leaves dead lizards on the carpet.

Herein my dilemma: I want to be a writer more than anything else in the world. I've scribbled the usual allotment of amateurish short stories; I'm objective enough to know that what small native talent I possess needs work. Writers don't make much money, and I won't sponge off Angie or government assistance; I decided that a long time ago. I have no other skills, and the thought of spending the next eighteen years of my life working at something else to pay for twenty-six minutes of passion—give or take ten minutes—horrifies me. Good grief, we only did it once!

But what utter self-absorption to

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say that proto-me must be extinguished so I can toddle off to college, become a writer and get *published.*

Frankly, I always suspected I was too much of a pushover. I always thought I'd *welcome* self-knowledge.

Out, out, damn line. Doesn't have quite the same cachet as "spot," does it?

So today I splurged twelve and a half Newdollars on an autocab to go down to the Reproductive Options and Empowerment Center, otherwise known as ROE. There's a beautiful section of Camelback only a half-mile away, where you can lie to yourself that you wanted to go anyway. ROE's downtown, where Luciferheads totter along crumbling sidewalks shedding their exhausted matchsticks like dehydrated Christmas trees drop needles. Worse, there's all these flat-headed government employees scurrying off to lunch down one-way streets.

Why are streets always one-way around government buildings? Is this some kind of existential statement?

Naturally, the clinic was overcrowded and smelled like the rear seat of a bus. Nobody talked in the waiting room. They read magazines or did *barrasta,* a kind of solitaire played with a round Tarot deck.

Two of the women had King-of-Light brands on their left forearms, long pseudonails like Angie's—only she wouldn't be caught dead in that DayGlo green—and what might charitably be described as a map of the world on their faces. Who knows, maybe the ordinary-looking ones doing *barrasta* were the hookers and the branded ones were the housewives.

A large, ominous-looking sign on the wall wondered, *Do You Have A Sexually Transmitted Disease?* There followed a list of revolting symptoms, with pictures of SCUD patients that made me regret that tuna sandwich with onions for lunch.

Telling myself not to be a coward, I walked up to the front and signed my name and the time I arrived on the clipboard in the window. I asked the clerk how long it would be. She didn't look at the appointment book or the sign-in sheet or anything, just sat there behind the fingerprint-smeared glass, chewing Betelnut gum, which I hear is a harmless habit as long as you don't mind black teeth. Finally she said, "Beats me. Sit down, we'll call your name when we get to it."

If I had a Newdollar for every time I've been told to sit down and wait for my name to be called, I'd now be investing in soybean futures. I grabbed the latest *Cosmo* and sat down to read the astronomy section (just kidding).

It took three hours and fifteen minutes to get in to see the doctor, a young sallow-skinned man in a dirty white coat. He had long coarse hairs on the backs of his hands, and unusually knobby fingers. I thought of him touching me with those fingers and tasted sour vomit at the back of my throat.

"You're not eighteen," he said.

"I am too eighteen. See this IDENT?"

He shrugged, indifferent to my scowl and my inadequate forgery. "I've seen hundreds of forged

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IDENTs. Take this form and get permission from your parents, then come back."

And that was that. I fumed all the way home. *What a waste of time*, I thought, though my blood pressure must've dropped twenty points the instant I set my foot out the door. The relief of not having to go through with it made me dizzy. I knew I should've got permission from Angie first.

I just didn't want to.

When I got home, Angie was lying on the sofa, listening to a self-help book. Angie doesn't read to learn anything new, she reads to have her notions confirmed, or "validated" as she would put it. "You're late for dinner again. I left it on the back of the stove."

I didn't give her any excuses, just told her I was sorry.

I should say right here that Angie's tried hard to be a mother to me, and I'm grateful for the effort she's put into it. She's never hit me, and she doesn't drink up the money she gets from the State, or spend it all on herself. She's worked at the state prison as "Chief Secretary to the Director of Rehabilitative Services" for two years. She tends to take up whatever psychoanalytical fad happens to be current at the prison, partially in an attempt to analyze why Dr. Malcolm hasn't asked her to marry him yet, and partially to deal with the discomfort I cause her.

Somehow I cause her a considerable amount, though I don't mean to. As a child, I read voluminously, not speaking for hours at a time; my immersion in science fiction, coupled with my family history, caused her to worry that I had "schizotypal personality disorder," the next best thing to schizophrenia. How else can she explain a genre she doesn't comprehend, except as a symptom of illness?

She wonders where she's gone wrong, because I didn't turn out as the slim, well-socialized extrovert with a Blassingame wardrobe she tried to make me into.

I find Angie's relentless pursuit of middle-class respectability pathetic and futile. She finds my fascination with writing dangerous—my real mother was a writer, a good one, and she fears I'll follow in her tragic footsteps. I guess you could say Angie and I love each other, in a labor-intensive sort of way, when we're not at each other's throats.

I won't go into gory details about how our evening went. I was starving and tried to eat before I told her about it, but she kept asking me where I'd been all afternoon, so I had to tell her. Suffice it to say that I didn't get to eat dinner until practically midnight.

The last thing Angie wants is an unwed daughter with a bastard grandchild, especially with all the babble in Washington about family licensing. She dropped the marriage idea the instant I told her where I met Joel. After explaining that I was entirely too calm, that she was sure I would need her to pick up all the pieces of my shattered life, she signed her permission on the dotted line.

* * *

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June 17, 2003—Saturday

What a beastly morning! I made three trips to the porcelain god in the hour of rosy-fingered dawn, as the Greeks used to call it. Nature is indeed a bitch. Why has the human race lasted so long if this is what we have to put up with to reproduce?

Angie basks in vindication. "Gillian, if I've told you once, I've told you a thousand times, your problem is that you refuse to accept reality. Now you're finally going to have to face up to it, aren't you?"

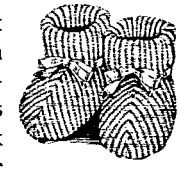
I know the State would pay my medical bills if I had the baby and gave it up for adoption. How independent of Gillian—poor broke taxpayers paying for her mistake. They already *are* paying, of course.

The other problem is, if the Family Licensing Act passes—likely under the current Congress—it'll make illegitimate kids count against the two you'll be legally entitled to have. Which will make it harder for me to get married, unless I find a man who wants only one kid. Not an impossible task, I guess, but I don't feel like much of a bargain this morning.

The other thing is that giving birth isn't without risk. I could die. No, it's not common, but the quality of State doctors oscillates madly now that they've lowered standards to make up for the shortage, and you're not allowed to pick and choose.

Angie would have a cardiac arrest if she knew I even contemplated going to college pregnant. As she is fond of reminding me, people just don't do that nowadays.

What kind of a job could I get that would support me—on my own and in college—until the baby's born? I can't think of any. Would I be sick during morning classes? Probably.



I cast about madly for an alternative, something that will show her I can face reality and fix my own problems. But what?

Finally I pull myself together and take an autocab back to ROE. When I get out, I see the religionists are demonstrating outside, Christians and Muslims by the looks of them. While inside are the Jewish doctors . . . it makes me think of the Dome of the Rock, where all three religions claim the same piece of sacred ground. I wonder if the Rock is egg-shaped.

So I start to go inside, and of course the minute I head for the door, the religionists come rushing over to stop me. They don't know I *didn't* come down here for a Negg patch, but it doesn't matter, they're against that, too.

I do sympathize with the Christians. Their money is being used to pay for something they regard as a crime, and a destroyer of society. On the other hand, they got rid of RU-486, and they regard me as a threat, which I have a problem with. Still, I can empathize with them more than the Muslim fundies, who are pushing for a law mandating female genital mutilation.

FGM means painful sex, so women won't stray from the straight and narrow, and decadent Western society will be brought to a golden age of sta-

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bility and goodness. Brilliant, right, except they left the male sex drive out of the equation.

All religions are crazy on the subject of sex. Except pagans, who are crazy for it.

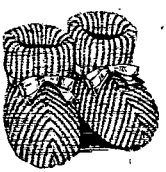
Anyway, this group of long-haired men and bald women in Birkie Boots comes pouring after the religionists in a wedge attack, shouting, "Escort! Escort! Every woman's entitled to *one! Rifkin v Smith!*"

But this wiry old gray-haired man happens to be standing in front, and he's obviously a Christian: stern gray eyes, long countrified sideburns, white leather Bible in his hands. I brace myself for the M-word. He fixes me with those eyes and says quietly, "You're going to regret this decision for the rest of your life."

"It's not my choice," I tell him. "I have no *real* choice."

Something strikes me about his face, in the split-second we stand there staring at each other. Condemnation, I expected that. But I see a softness lurking in those hard planes and angles. I imagine him taking his grandkids to Disneyland and maxing out his Newdollar card on Mickey Mouse hats and cotton candy.

The long-haired men shove their way past him, and do this arm-link blockade so I can walk to the clinic door. I walk surrounded by them, feeling ridiculous. The guy next to me has greasy black hair and a handlebar mustache, and is wearing a pink T-shirt that says *Socialists Ensure Xylophones.*



I shouldn't have come here on a Saturday.

There's a struggle at the door when a fat woman with big hair tries to strangle the SEX guy with her rosary beads, but I make it inside.

The same bored-looking parasites are sitting in the same waiting-room chairs, reading the same magazines and playing *barrasta.* A girl in the corner smirks at me—Forrie Hanover-Gish, an illiterate tobacco smuggler for a shag house in Donia Fells. I sign in at the desk and sit down as far away from Forrie as possible. Maybe I'll ask one of the *barrasta* players to tell me my fortune.

Screw it, I don't want to hear about my future right now. I'm in a funk, the worst one since Mom died.

I could tell by the way Angie said good-bye this morning that she'd no intention of volunteering to come along and hold my hand. It'll be good for my pathological notions of self-reliance to see how much I need her. Therapeutic, you see.

I'd rather die than go crawling back to her. Everything she offers has strings attached. What's wrong with being independent? I don't want to be like my mother, so clingy and dependent that in spite of her success as an artist she couldn't let go of a good-looking creep with the emotional development of your average brick. Would she rather I were more like other kids: no job, doing poorly in school—if they go—and no ambition to do anything but get rich booting leaf, flashing Lucifer, or acting as a

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bodyguard in a shag house?

But I'm not like my mother. I'm like my father, aren't I? Selfish and self-absorbed, destroying something soft and helpless so I can be free to do as I please. I feel dark inside, like something that should never have been born.

"Blessing! This way, please. . . ."

The nurse takes me back to the exam room, and a different doctor rolls in. I sit there staring at the jars of industrial-strength disinfectant, the steel instruments, and the four-color posters of SCUD attacking the male and female reproductive systems while Dr. Janigar checks my IDENT database to make sure I've never had an abortion before ("Only one per lifetime allowed now, you know") and explains the different procedures.

Dr. Janigar's young and sleazily handsome, his black slicked-back hair unsuccessfully hiding a cowlick. He's wearing this snazzy black tie with little stethoscopes imprinted on it and a teal Mercedes tattoo on his left cheek. The whites of his eyes are yellow.

I glance away when I notice the left one twitching rhythmically, and see spots on his tie that look like dried blood.

I stand up suddenly. "I'm sorry, I can't go through with it."

Dr. Janigar, old hand that he is, isn't terribly surprised. "Yeah. Well, be sure to come back and get a free Negg patch right after the birth. That way, you won't ever have to worry about the unreliability of other methods. Now, for your mandatory SCUD test . . ."

"Got my home test kit, thanks." I'm out the door like a shot. Forget that stupid patch. I'm not having sex ever again, and even if I did, I wouldn't come back here for the tobacco franchise on a Tennessee Reservation Trading Post. (I don't smoke, but if I had a franchise like that I'd be rich, wouldn't I? Then I wouldn't have to worry about any of this.)

To my relief, Dr. Janigar doesn't chase after me screaming about my mandatory SCUD test. He's probably still sitting there, smiling vaguely at the wall.

I slip out the back way, avoiding the protesters. The bright afternoon sunlight hits me like a blow, and I shiver, wondering what I'm going to do, how I'll live. Then I see two cadaverous Lucys ambling down the alley toward me. With their slicked-down, shoulder-length hair they resemble some anthropomorphized cartoon of the Lucifer sticks they live to inhale.

I don't understand much about Lucy psychology. They've got a religion built around it, claiming they're all visited by the same God. There's some South American tribe, I forget the name, that uses massive doses of tobacco to see their God, too.

Lucys are crazy as an outhouse rat when they're down, and sweet as kittens when their God is visiting. Nicotine's a poison, but somehow they manage to build up a tolerance; the Supreme Court hasn't ruled yet on whether the Substance War violates their freedom of religion.

I wonder what

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it would be like to sniff the smoke from freebased heroin-nicotine, burning my fingers in religious ecstasy.

Nah.

"Peace be unto you, Sister," says one of the Lucys, a reddish-haired boy with one brown and one blue eye.

"The King-of-Light brings the one true Peace," I tell him in standard Lucy parlance, implying that I'm one of them, and therefore not a proper subject for robbery.

The boy nods gravely. "Celebration tonight on South Mountain."

"Good news," I say, hiding a shiver. I mean, what if there really is a God, and He's *it?* Horrible thought. Lucys give me the willies—is that a word, Lucywillies?

The second one bobs his head, his eyes fervent and happy, and they amble calmly away, thank goodness, before I start laughing. Or crying. What were these two like when they were little? I can't believe anyone ever read to them.

Thinking about Lucys, and what utter slaves they are, made me think of Second Chance. I start thinking about how wealthy they are from slave-trading, and how having a child out of wedlock is the single biggest guarantor of poverty there is.

I can't think of a bad enough word to describe them. Their stores should be taken apart brick by brick, and the ground beneath sown with salt, like Rome did to Carthage.

My dendrites giving off small, dark sparks, I storm off up the narrow crooked street leading north, away from ROE Center. The street gets kinkier and the houses draw back, shaded by more and more trees. Presently it gives out onto Camelback.

Camelback is like Park Avenue used to be—dignified, niche shops catering to the idle rich. Across the street, I can see *Literati*, and for the hundredth time I wish I worked there. Their science fiction section is small, but solid, and the antique section is fantastic. Audiobooks? *Literati*'s never heard of them.

I'll never work at a place like that now. Hey, maybe if I got a job as a stripper, I could afford my own apartment, college and a kid! Tiger Gil, the stripper with stretch marks. No, thanks.

Feeling incredibly stupid and irresponsible, I blaze down the sidewalk, a blur of adoption horror stories cycling through my brain.

My blob of protoplasm will be "disadvantaged." I don't trust State Adoption to do an adequate job, and I don't have the resources to do it myself. What really grinds me? The inevitability of it all.

I suspect that the only way to be responsible is to relinquish my dream of writing and get a practical job . . . say, selling TEMPEST-proof computer equipment to government hacks. The agony of this thought cannot be adequately described.

Presently, I found myself looking in a curved, invisible-glass window. The sign is in prim Times Roman lettering on a narrow dark-blue ribbon. *Second Chance.*

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There's a golf ball-sized lump in my throat. I wish *I* had a second chance. I'm not that practical, I can't be; I'll expend my last breath tilting at windmills. *But at least I'll have the satisfaction of doing the right thing.*

I peer through the glass at the photographs arranged on the navy-blue velvet. Smiling couples holding babies, six assorted and extraordinarily handsome children, and three young women in graduation caps and gowns. One looks familiar, but I can't place her. You'd never guess these people were slavers, would you?

Next to the photos is a small, discreet manila card: A. Harriman, M.D.

Harriman must be a DNA specialist in designer offspring for the rich, but the three graduates puzzle me. Surrogates rarely go to college.

I push open the heavy glass door and walk inside. There's a low sofa sitting on a bare parquet floor done in four shades of gold, with a counter, a curtain, and two oil paintings on the walls. The paintings have the look of Renaissance originals, and are probably worth a fortune.

Next to the paintings is a vanishingly small sign listing services with prices.

Defect-free sperm—either your own, or someone else's—costs anywhere from one hundred to ten thousand Newdollars per successful insemination. I heard somewhere that most people carry around five to ten lethal genes, so there must be a base price for engineering those out, and then they go on up from there.

They offer both in-vivo and in-vitro fertilization, the latter with the Harriman Method, which has been shown to decrease the chances of a "yield" greater than twins by 86 percent over conventional treatment.

They contract host-mother services, of course, as well as frozen defect-free eggs, with a differential price for frozen embryos and frozen fetuses. Monozygotic twins and clones are double and triple price. Base price includes genotypic analysis with computer imaging, no extra cost for age progression through adulthood. Listing for personality traits and behaviors which have a strong genetic component are shown with statistics from the Tokyo-Austin-London Twin Study, along with percentage of Second Chance children who exhibit them. Traits cannot be guaranteed, etc., etc., see our home environment consultant for optimizing intelligence and learning skills.

I took a look at the numbers and whistled. One-stop shopping for Superkid. My poor little non-genius blob probably wouldn't be considered good enough to shine his shoes.

A tall man appears through the peach-colored damask curtain. He has very white hair combed straight back, and a tan, outdoorsy complexion. Overall he seems quite fit, though he has to be pushing seventy. He's wearing a thin, expensive navy pullover and tweed slacks, with a narrow maroon tie that must've belonged to his British great-grandfather. "Good afternoon. May I help you?"

I think of a half-dozen verbal mis-

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siles I'd like to fling at this mercenary monster, this fiend in Anglophone form. What comes out is: "I'd like to know a little about your business."

He nods. "Well, we specialize in what are popularly called designer children. Dr. Harriman has pioneered a number of useful techniques in the field. We offer personal engineering, with the emphasis on health first and traits second. We also offer cryo-storage, contracts with surrogates, all licensed and bonded, and placement contracts in certain other situations."

His accent is solidly upper-class British. In spite of my self-righteous fury, I liked his eyes—clear, light blue, steady gaze.

"What are placement contracts?"

His mouth curves in a smile of genuine pleasure. "They're our top-of-the-line adoptions. They are quite expensive, and we don't do a large number, but customer satisfaction is substantial—significantly higher than modified sperm, which is our biggest seller."

"'Placement contracts' sounds so much nicer than slave-trading."

The smile disappears, and in its place is a look of frosty dignity. "If you wish to buy a . . . person, I'm afraid I can't help you."

"I don't wish to do any such thing, and I believe you know that." My glare could melt his frost at a hundred paces. "People like you have the intelligence and the resources that could be put toward real adoptions for poor children, but instead you've found this loophole in the law so you can traffic in human flesh. *Improved* human flesh, no less. You've made eugenics profitable and reinstituted slavery. You're about as vile as a person can get, and I'm here to tell you I'm going to put you out of business. I don't know how, but I *will* do it."

The blue eyes meet mine squarely. "I see. Do I take it that you wish your children to be better off than yourself?"

I give him a fractional nod. "A foreign concept to you, no doubt. I've read George Orwell—'Freedom is slavery, slavery is freedom.' You should stamp that on your credit cards."

The door opens and a young woman comes in. She's beautiful in an elegant, understated sort of way, and she's wearing the lovely but careless silks now so popular in Net culture. "Gil! I never expected to see *you* here!"

"Sally? Sally Jastrow?" It takes me a second to recognize her, and then I realize that's her picture in the window. The last time I saw her was just before she got busted for peddling homegrown cigars. What a mess—she'd gotten off with a plea and rehab, and then she'd disappeared.

"In the flesh," she says with a light laugh. "I got a job as a software engineer for Howard Systems."

My opinion of her circumstances revises upward logarithmically. "That's madder!" She's three years older than me—in grade school, she was the only friend I could talk to like I talk to my journal, the one who never made me feel like a nerd. "How did you. . . ?"

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Sally grins. "You mean, how did someone headed for the gutter manage to get a job at the most competitive software firm in the country? Just ask Jamie."

"Jamie who?"

"*Him*. Mr. Jameson. Hasn't he gone over the contract with you yet?"

"Which contract?"

"The Biological Parent-Child Rights, Responsibilities, and Reimbursement Contract. You're pregnant, right?" Sally glances at the proprietor, who'd retreated behind the counter. "Really, Jamie, I thought you'd show it to her immediately."

Jamie clears his throat delicately. "Er, Ms. Jastrow, we haven't discussed—"

"I don't believe it." I give her a look that would crash a disk drive. "You got pregnant, and you sold your kid into slavery. That's how you got through school!"

Sally sighs. "Really, Gil. I expected a more intelligent response."

"Oh. Well, pardon me for being dumb enough to think pregnancy shouldn't be profitable."

"It shouldn't be anything else if you do it right," says Jamie, holding up a perfectly manicured hand. "If you will permit me to explain . . ."

"Go ahead, knock yourself out." I smile. "It should prove an interesting exercise in rationalization."

"If a woman is going to have a healthy child which she cannot afford, and is considering abortion because the father does not want it, I will contract with her to pay for birth expenses. I then broker the baby to a good home for a high price, of which she gets 60 percent. That money is an incentive for her to take good care of her investment."

"What a calculating word *investment* is. Surrogates get reimbursed, too, but anything beyond expenses makes it slavery."

Jamie seems unimpressed. "Whether animal, vegetable, or mineral, resources poured into something for long-term benefit are investments. Should you not be compensated for the length of time it takes to produce this person, as well as the risk to your life from carrying the baby to term? And the morning sickness, the weight gain, the probability of stretch marks, the inconvenience and general upheaval of your life?"

I feel queasy just listening to him. "Well, sure. That part makes sense. But you're still paying someone to produce a human being, which you then sell to the highest bidder."

He gazes at me with those clear blue eyes. "I believe it is slavery to be forced to risk your life, your body and your time for nothing. I also believe that a child is most people's biggest investment in the future, and that it pays dividends not countable in New-dollars. Tell me, do you wish your child to be better than you yourself—smarter, taller, better-looking?"

I remember a line from my favorite poem of Joel's, "quasar, quasar, warm my interstellar bone, galactic brazier to the far-flung alone. . . ." Quasar and brazier don't exactly rhyme, but it was certainly creative, wasn't it? "I don't care

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about looks, but I would like my kid to be smarter than I am."

"Then you believe in eugenics. If you don't like artificial selection methods, that's a matter of personal preference. Now, have you ever owned a cat?"

"Sure. Her name's Chairman Mao—Mao is Chinese for cat."

"Did she ever have kittens?"

"Twice, and then I had her fixed. I was lucky to be able to give them all away. Except two of the ones I gave away died a few weeks afterwards."

"Mm. Do you suppose if you'd been able to sell those kittens, they might've gone to better homes? Ones where they might've received better care?"

He had a lot of nerve, lecturing me on how to find good homes for kittens. "I did the best I could."

"I'm sure you did. Home evaluations are difficult and complex. Who do you think would provide a better home: the person who got a free kitten, or the one who paid a high price?"

"Well . . . the latter. Except sometimes the rich are bastards, too."

He doesn't turn a hair. "Indeed. Auxiliary screening is vital. Now, suppose I gave you . . ." He names a sum that makes my ears burn. "... for a healthy infant. Or embryo, if you'd rather do that at half-price. I guarantee it a good home, and you take that money and go to college, or whatever it is you wish to do. Would you consider it?"

"No!"

"Why? Does the father want it? Or would you rather be on welfare?"

I clench my fists so hard, my nails dig into my palms. If Jameson knew *anything* about welfare, he wouldn't ask that question. As for Joel's wants, I couldn't imagine him looking beyond his next poetry anthology. "One, I don't believe so, and two, definitely not. A good bribe doesn't make it right. What kinds of mothers would sell their children? The babies would probably all be withdrawing from drugs. . . ."

Sally shakes her head. "How do you think I motivated myself to quit smoking? The incentive of a big bonus for a healthy child, and nothing at all for a sickly one, had a lot to do with it."

"Maybe Mr. Jameson can't tell the difference."

"I can tell," says Jameson flatly. "Sally quit smoking two months before she got pregnant. A child born under one of these contracts has more explicitly defined rights than one born under more conventional circumstances; a large part centers around being free of alcohol, tobacco, and other harmful drugs. I believe it's the most important part of the contract. Our policy is modeled on the Chinese approach to medicine—you pay the doctor when you're healthy, and you don't pay him when you're sick."

It takes me a while to mull that one over. A rebellious part of my brain notes that neither choice is without cost: destroy the little blob with other people's money, or sell it to someone who'd pay top dollar. In which case does priceless equal worthless?

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"The Adoptive Parents Association *lobbied* for this," Sally said.

"Then why don't they offer it at ROE Center?"

Sally shrugs. "They offer one kind of deal based on what they think people want, and Jamie another. How much luck would he have with *any* responsibilities contracts downtown?"

Jamie returns with a disk and a viewer big enough for two people to look through. Sally pops the disk in, and she and I go through the pictures of her kid.

"She looks smart," I say after a moment, and not just because that's what you're supposed to tell people. The kid has the same bright eyes and go-to-hell grin that Sally has. (I've been told mine is similar. Wouldn't it be nice if we were related? But we all are, if we go back far enough.)

"She'll be nineteen months on September 8th," Sally replies proudly. "Best of all, she lives with two people who love her and provide for her. Meanwhile, I know I've done the right thing for her, and I get to make something of my life. It's a tough contract, Gil, but I bet you could do it. Good grief, you don't even have to quit smoking!"

I lift an eyebrow at her and Jamie, a gesture which Sally always said reminded her of Mr. Spock.

"I think you'd better show me that contract."

January 30, 2017

Dear Danielle:

Thank you for the kind comments about *Dark Matter Angel*. It's my first hardback, and I'm so proud of it, I still have occasional dizzy spells.

And speaking of which, I'm thrilled to hear you made the Dean's List for the second time at Ansonia Prep. I must say, I admire your dedication and hard work. You're much more focused than I was at your age.

Your mother and father have decided you're mature enough to handle the specific information that you requested about your birth, so here it is.

Thank you for giving me my life, and for helping me grow up. Most of all, thank you for being the wonderful kid you are.

Love, Aunt Gil ■

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Jonny M. Duffy &
G. David Nordley

FROM EVERY OPENING FLOWER

"If it feels good, it is good. . . ."
Oh, yeah?

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"Everything's negative, Mike," Nadine's husky voice reported from the starship *Jacqueline Cochran*'s biological analysis station. "They're just gone—and we can't tell why from up here. There's nothing left to do but go down."

Commander Mike Tanner slapped the arm of his chair in frustration. After a month in orbit, the mystery remained. His screen was filled with the planet—a blue and white, green and brown work of art from here. They'd scoured the abandoned settlement with flying and crawling robots and flown through its buildings and forests in virtual reality. The colony's starship was still waiting in orbit, fully functional—if they'd gone somewhere else, they'd gone in someone else's spacecraft.

Mike's older sister, Dena, had been its chief bioforming engineer, and had been down there when the colony fell silent. Gone. He remembered her, not so much as an executive engineer, but as a pixie-haired adventuress, always taking him to new and different places.

Different. "OK, everyone. I think Nadine's right. I don't think another orbit or another week will make much difference. We can go down, or—" he offered silent apologies to Sis and all the people back at Tau Ceti who'd worked on the colony "—we can quarantine the place and go home. Nadine?"

"Mike, you sound paranoid. We didn't ride that beam six light-years just to turn around and go home. Look, whatever happened, happened long ago. The water, the air, and the dust are fine. Genetic samples of everything matched the file data. There's no detectable threat now."

An hour later, the shuttle *Yeager* settled itself down on pillars of annihilation-heated steam into the crater its exhaust made in the overgrown landing field. Mike's chair rotated forward until his feet touched the flight deck and he looked down "through" the viewscreen-covered hull. It was a brilliant clear day with the hazy disk of Epsilon Eridani high in the soft blue sky.

Dena had loved this world—"It's going to be a really beautiful place. This is my baby, Mike," she'd said, and since its discovery 130 standard years earlier, the Mars-sized world had been her only baby. Now, he'd inherited it, as he'd inherited many of her toys, so long ago. A tear formed in the corner of Mike's eye. He'd come as soon as he could, but after fourteen years, there could be no real hope. The Universe, he mused, was not built to human scale.

"Not too lively, is it?" Ian commented. A tall, graceful Englishman, lately from the Nova Britain subcontinent of Tau Ceti III, Ian was reserved, but highly competent. Now, with dry humor, he chipped away at the tension that had been building for the three months since they'd revived on entering the Epsilon Eridani system. "You'll be all right, Mike?"

Mike rubbed his eye. "Yeah. Make sure the data gets up to the *Cochran*."

Ian nodded. People double-checked robots that double-checked people. "*Cochran*, *Yeager*," Ian called the mother ship. "We're down nominal, Rod."

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"Copy, *Yeager*," starship pilot Rodrigo Cruz replied.

Nadine greeted Mike at the airlock with a smile, her large sparkling eyes framed by high Slavic cheekbones. Her hair matched Mike's, a light, almost golden brown, but in contrast to his functional crew cut, it streamed all the way down to her waspish waist. Her willowy, almost Gothic 185 cm topped him by 3. It was all self-engineered; her original body had lasted only as long as it took her to get her doctorate in postnatal genetic engineering. She liked looking different, and Mike, in the way that opposites attract, liked that in her.

She looked Mike in the eye—down a little, actually—and gave him a hug. "Warm out there, lover," she said. Her rich, earthy contralto contrasted sharply with her ethereal appearance, by design.

Lover? As the two senior expedition members, they were more comfortable sleeping with each other than with anyone else and, without any stated intention on either of their parts, it had become exclusive. But Mike would not yet admit to love.

Mike handed Nadine a thirty-centimeter-long double tube with a grip, a trigger, and a five-centimeter viewscreen on the rear end, and a magazine of stun darts, comm flares, and microprobes.

"Why guns?" she asked. "There's nothing down there. Nothing."

He smiled. "That's the problem."

The door hissed up to reveal the cone of an extinct volcano set behind a vista of green. Leaves rustled in the breeze and the smells of the rain forest flowed in over them like a fog of perfume. Other than the geometric boundary of the landing area, there was little hint of human habitation.

Mike wondered how the captain of the first ship to go looking for the Roanoke colony had felt when he came ashore in Virginia, six centuries ago, and found nothing left but ruins.

Mike led the way to the edge of the landing field, scrambling over the rim of the blast crater and on through thick cloverlike plants that squished and slipped beneath their boots. Insects buzzed among brilliant flowers, pursuing their pollination duties. Bird song punctured the silent air—a mourning dove, or its local version, Mike thought. Appropriate. Small critters made occasional scurries.

His sister's holos had shown her riding horses. Where were the horses? he wondered.

They reached the edge of the field, poked around some overgrown but otherwise intact port structures and gazed through underbrush at the deserted buildings a half-kilometer away. The hour went quickly, and they returned to the hatch. There, Nadine tested their blood and nerve functions.

"No ill effects." She gave him a look that implied, *Let's get on with it.*

Mike frowned, then nodded and called the rest of the team.

There were ten of them, altogether. They walked into the colony on what used to be the main street, pushing away vines and tall grass and sweating with the effort. The lower gravity—less than half that of Tau Ceti III, or Earth—was little help and, in fact, reduced traction. Observation motiles

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flew silently overhead, covering the area from millimeter wave to ultraviolet and sending the data instantly to the orbiting *Cochran*.

Once, Mike recalled, the colony had been a carefully tended garden, thoughtfully integrated with its rainforest environment. Now, trees grown twice as big as their ancestors on Earth crowded the sky. Lawns were shoulder-high brush fields, and hills of orange and purple Wendy flowers outlined what had once been walks and curbs. The streets themselves had been overgrown to the point where they were simply paths of lower-height vegetation.

Once in the buildings, they looked by instinct—poking under furniture, prying open doors the robots hadn't been able to, touching, analyzing, sampling, and speculating. Hours went by, then—

"Mike, Kay Singh, at the Admin building. I just got the data storage room open. It's been ransacked." Their astrophysicist was a deliberate, low key, and usually understated woman, so whatever got her excited was likely to be interesting.

"I'll take the feed," Mike said.

The picture from Kay's robot floated in front of Mike. The room was a mess. It had been a typical installation; the central processing units had been five-centimeter cylinders set on an optical shelf a couple of meters long. The shelf had been pulled from the wall and each of the CPUs lay shattered. There were dark—almost black—stains beneath the years of dust on the floor. Nothing moved—which proved nothing, Mike thought. If they were dealing with something alien, the operative concept was that any sufficiently advanced technology would be indistinguishable from magic—and being invisible to a robot might be a relatively easy trick.

"Guess we'd better take a look personally."

"I'll wait for you," she said.

Mike took his gun from his belt kit. "Stun darts," he told Nadine. "Better safe . . ."

Nadine got her own out.

Mike looked at her. "You're joining me, then?"

"Wouldn't miss it." She brushed a caterpillar-like something off her arm. "Yuck. You go find a leaf."

Mike said, "We'll need to reestablish plant and insect control here." The bugs were designed not to bite people—as soon as their primitive little sensors recognized one—but sometimes that required crawling on you. "The jungle seems to be overrunning everything."

"Yeah."

They reached the Admin building in minutes. The only two-story structure in the little colony, its wide, debris-covered staircase yawned at them ten meters inside the front door. Some local version of ivy had followed its banister up as far as Mike could see. Nadine took the point without asking, flashing him a daredevil grin, and he smiled back at her. Excitement like this was hard to come by, and she wanted it all. He didn't blame her.

They stepped through the entrance. The colony and its own eyes were still

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powerless, but Mike's visor display told him the ship had activated the tiny cameras all crew members wore—there would be a visual record of anything out of sight of the overheads.

They climbed the stairs to the data management area, a circle built around a tall redwood that must have been one of the first plants started in the area. The hall was a torus around the tree, and the rooms were truncated pie-wedges around that.

"Here," Kay called to them from a quarter circle around the inner balcony. They came and looked. Broken equipment, furniture, glass, artwork files were scattered around the floor.

"Animals?" Mike wondered out loud.

Kay shook her head. "I don't think so; the door probably jammed shut when the power failed."

"Probably. It should be reasonably safe," Mike said, but he worried. No Earth life would have stayed inside for fourteen years waiting to attack the next thing to come through the door—but the possibilities included crazy robots and aliens.

Kay looked further down the ring. "I have a few more doors to open."

Mike nodded, "Go ahead. But be careful."

She nodded and left.

He looked at the room. It was utterly still. Kay's probe showed everything he couldn't see himself. Empty. He walked briskly into the middle of the room and turned, gun ready. His feet crunched pieces of plastic and glass on the floor. Nothing jumped him. He scuffed the dust off the floor with his right boot. There were stains beneath the dust.

"Nadine . . ."

"OK. I see it." She came in, bent down, and placed her analyzer on one of the stains, brushing away shards of shattered plastic. This stuff is too tough to break from falling, Mike thought.

"Blood," Nadine announced, standing up from the dark stain. "It almost looks as if they fought a battle with something. Something big and violent that hated computers."

Mike shivered. Abduction? Sabotage? Insanity? "There's nothing larger than squirrels and—what did they name them?—wood rats, left on the entire island."

"You're the one with a drawn gun."

With a wry grin, Mike pocketed his pistol. No alien attack this time. "Let's see if there's anything in the maintenance record. There should be some non-volatile memory left around here."

He found what was left of the physical data storage rack on the floor. Parts of the pencil-sized broken optical data wands were scattered on the ground. "Whatever did this didn't want to leave any records."

But the wall mounted comm unit seemed intact. He pulled off the face plate and looked in its hole—the wand was still in it.

"But they missed one." Its label glowed as his hand warmed it: "Data management room," he read aloud. "Not full. It might have a record of what happened here."

"I'm not sure I want to watch."

Mike's incoming call tone sounded. "Tanner," he said.

"It's Harrison. We've found their graves."

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"Graves?"

"Graves, Mike. Under the orchard. It's a bloody burial ground! I've got the video on four."

When was the last time, Mike wondered, that he'd heard of a body being buried? People died of accidents every now and then . . . but usually when there wasn't enough of a body left to revive, the rest was ceremoniously burned. There were, of course, some sects, back on Earth.

"Opaque, display four," Mike whispered. Instead of the room, he saw the orchard.

The site was covered by a canopy of fruit trees as wide and tall as oaks in this gravity.

Mike remembered seeing the area in passing on ground probe video—mounds in neat geometrical rows filling the spaces between the trees. He hadn't thought that the mounds were anything unusual at the time. "It looks like cultivation."

"Oh, not far off," Ian said. "Those roots and branches would camouflage the radar image. I saw the survey VR, but it didn't come through up there. Here, I felt it. Now that I recognize it—it's obvious." Ian was originally from Farnham, a town in England in an area still rich with old churches and cemeteries. "We opened two of the graves. They were buried in food preservation bags."

The video zoomed in on two sacks lying in shallow pits ringed by dirt. The human forms within the sacks were clear. "We let the gas out, so come look if you want."

The thought that one of those could be Dena sent shivers through Mike. "On our way."

"Roger, Mike. If you don't need me, I'll be down the hill working on a transporter."

Mike turned to Nadine "Plague?"

"Something biological, probably." She shook her head. "But why didn't they tell us? And why, literally, cover it up?"

He looked at the data wand for a moment, then put it in a coverall pocket; they could view it later.

"*Yeager,* alert everyone to be on the look out for symptoms of . . . something." He turned to Nadine. "Let's go." They left the building and loped for the hill area. Outside, birds sang, leaves rustled, and brilliant flowers tossed in a gentle breeze.

The orchard reminded Mike of the inside of an empty cathedral. The tree trunks, grown large in the low gravity, stood like columns supporting a speckled green ceiling.

Nadine walked between them, scanning the mounds with a field radar probe. "There's just enough cover to keep them cool and away from the wood rats, I should think. They get shallower, and less ordered as you go back in, as if whoever was digging them was running out of energy. There are remains in all of them."

Mike shuddered.

Nadine touched him. "Go down and talk to Ian. I'll handle—this."

Mike nodded silently and stumbled down the hill.

Ian was trying to revive one of the colony's ground vehicles, a flatbed transporter. Tool kits were laid out among the grass and flowers where

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one would more likely have put picnic baskets. Several of the crew stood nearby trying to act helpful.

But Ian was in his element. He'd worked on projects from the Venus sunshield to the Nova Britain Equilateral Power Station, and seemed to be familiar with almost any technology ever devised.

"If I can just hit the right waveform for this old power receptor," Ian said. "There! Its little idiot brain is up." He clapped his hands in satisfaction. "Now all we need to do is provide some energy. If you'd be so kind as to hand me the end of that cable, Mike. . . ."

Mike pulled his thoughts away from the bodies. Have to get back into the mission, he told himself. He wasn't the only one who had lost relatives or friends here. "We have local power?" he asked. The colony had been stone dead, probably since the central computer had been destroyed.

Ian flashed a rare grin. "I wouldn't want to be using anything from *Yeager* without your say-so, Commander, would I? Mutera and Silvany have the hydro plant going again, up at the crater."

Hydro, of course, Mike recalled. Despite the warmth, sunlight was less intense here, and it was often rainy. The ancient caldera four thousand meters above them had been plugged, dammed, and filled with fresh water to serve as the colony reservoir. Dena's doing, probably—much simpler than a fusion plant, no tritium residue, and it would have appealed to her historical sense.

Ian turned and stared at him. "Look, Commander, we can't bring Dena back, but we'll make it right for her, won't we, now?"

Was it that obvious? Mike wondered what the hell his face looked like. He nodded to Ian.

"Mike, the work up there—" Ian gestured toward the orchard hill, "it was done by hand, I'd say—after the equipment shut down. Nadine's still up there, is she?"

"Yes," Mike said. "Maybe long enough."

"Mike?" Nadine called, as if summoned by his thought. He looked up the hill, and she came down toward them, taking the long strides of a human in a hurry on a Mars-class world. But going downhill that way had its risks, and she unceremoniously slipped and tumbled into a muddy creek bed at the base of the hill when she tried to stop. She stood up and shook the mud off her hands in disgust and pulled a hibiscus from her hair.

It might have been funny, but they all had very unfunny things on their minds and no one laughed. Mike and Ian loped over to the bottom of the hill and helped her up.

Nadine tossed her head back toward the hill, sending a wave of dirty hair over her shoulder. "One hundred and twenty-six graves."

Mike flipped his visor down and gazed skyward for a moment as it displayed the colony data. "There were 127 personnel on Griffith. . . ."

"Quite," Ian remarked. "So number 127 couldn't bury him or her self."

"Assuming the 127th person did die," Nadine added.

People shifted their feet uncomfortably. A survivor? Or a murderer?

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"I know what you're getting at," Mike said. "It's unlikely that only one person would have survived what killed the others—unless he or she *was* what killed the others. We've done a pretty thorough search, but we assumed we were looking for someone who *wanted* to be found. There's no way we'd find someone in that jungle who really didn't want to be found. It's been fourteen years, I know. But still, he or she might be a bit unbalanced by now, and maybe dangerous."

"Mike, let me take a good look at the bodies before we assume that," Nadine said, scraping mud out of her hair. "Ian, can you get some people together? I want those graves exhumed. You'll need to be careful—the food preservation bags weren't designed for years of underground use; they could burst—"

Ian held up a hand. "Uh, Mike, I'd rather get some of the robots together for this. They'll get the job done faster and they won't be making quite as much stink about the proceedings, if you catch my meaning."

Mike was unable to suppress a smile at Ian's black humor. "Good idea." He turned to Nadine, who would be dealing with the bodies, regardless. "Plague?" he asked her.

"No." She shuddered. "These people didn't just get sick and die. I got radar images of some of the skeletons. Broken bones—lots of trauma."

"A riot? Caused by something psychotropic?"

"Not impossible, but any saboteur would have had to bypass the water or food supply screening equipment. More likely some biological factor."

"Could a killer—or killers—have been under its influence, too?"

"Either that or the colonists might have gotten crazy the old-fashioned way—on their own. Or there's something we just don't understand—something that's not chemical, not biological, but that somehow gets to the brain through another channel. I'm not getting weird on you. Lights flashing at certain frequencies used to drive some people to convulsions."

Mike frowned. Mass murder from light flashes? "Suppose someone was reasonably sane but wanted the place alone and was sufficiently ruthless to do it that way. Still, that's just a different kind of psychosis, isn't it? Megalomania?"

Nadine smiled. "That might be paranoia—on your part. Who'd want to rule a whole world with no other people in it? He'd be totally isolated, almost half a dozen light-years from company. And I don't think one person could have done this, sane or otherwise—people would defend themselves, eventually."

"Maybe they did," Ian said, "and lost."

Mike shook his head and looked up at Epsilon Eridani, a smaller disk than Tau Ceti as viewed from his home world and not much larger than Sol viewed from Earth. "I can't believe a First Contact would come down this way. The handful of people wouldn't be much of a threat to them—besides, anyone watching us ought to be too far ahead of us to be doing that kind of thing, wouldn't they?"

Ian nodded, but frowned. "That's the prevailing theory. On the other

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hand, there are human beings that torture insects, dogs and cats just for the fun of it. I'll have the *Cochran* do a more intense survey of the highlands. Keep an eye open for evidence, just in case."

"Which brings us back to a possible survivor," Nadine said, fixing her hair behind her back. "Ouch." She pulled what looked like a caterpillar from her hair, frowned at it momentarily, and tossed it aside. "I need a shower. This jungle isn't all nice—he or she may be in trouble."

"OK," Mike conceded. "It's a long shot, but you could be right. He or she may be in trouble, but may just as easily be dangerous—to us. We'll reallocate some of the robots to guard duty from now on. *Yeager*," he spoke to the ship, "notify everyone on the ground net so they don't get irritated."

Nadine shook her head and sighed. She thought he was overdoing it, he knew. But he was responsible for everyone. He touched her mud-splattered arm. "And please don't you go off alone either," he implored. She gave a noncommittal shrug. Constraints on a free spirit were a hard thing—but Mike needed her, and needed to be sure of her.

"Wouldn't think of it," she muttered.

Nadine's tiny lab filled one side of *Yeager*'s infirmary, and its autodoc and a bunk over it hung like porch swings to stay level under any combination of lift or thrust. Cabinets filled the walls above and below the lab bench, and video screens lined the wall at eye level, above a work surface brightened by a vase of Wendy flowers. Nadine sat on the stool in the center.

Mike watched her work—she was concentrating very hard on something more important than his questions—and he was reluctant to interrupt. Besides, the wait gave him precious time to think.

Even in virtual reality, the autopsies were . . . grisly . . . and time-consuming. From the start it was obvious that all 126 had died violently. Gunshot wounds, stabbings, bludgeonings, immolation, and signs of torture marred each corpse. Aliens wouldn't be using human-style weapons. . . .

"That should do it," Nadine finally said. "Gunshot wounds. The trajectories indicate the bullets radiated from about here." She held a hand out in front of her chest as if holding a handgun. "I'd say they were self-inflicted. Mike . . ." She was trembling. "The subject was a ten-year-old boy."

He put a hand on her shoulder. "Care to go for a walk?"

She sighed, then turned and smiled at him. "I'd love to."

With surveillance robots silently winging overhead, they left the ship and trudged up past what they now called "Boot Hill" to a dome of rough lava that stuck out above the trees. There were plumeria and Wendy flowers about and the smell was heavenly.

From the hilltop they could see "Chip," the ruddy, pockmarked natural satellite of Griffith's World cut in half by the sea horizon. It looked like a huge flattened half dome, ten times the apparent radius of Luna from Earth and distorted like a wavering

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mirage by refraction through the thick atmosphere. A synchronous moon, it would never rise or set, but it always seemed to be doing one or the other, bobbing slightly up and down on the planet's thirty-four hour diurnal cycle.

Nadine started to undo her suit's fasteners.

"We're being watched," Mike reminded her.

"Good," she said. "I itch all over. Prickly heat. I feel like one big sweaty itch and I want out." She gave him a grin. "Mike, there's not a damn thing out here to worry about. It's gone now."

He shrugged his shoulders and glanced at the moon on the sea behind her. The environment was, he thought, almost obscenely erotic. The heat, the odors . . . Leaves rustled; from the wind or an animal, Mike couldn't tell. Life all around him. "Are you ready to release the autopsy reports?"

She frowned. "No. It's been slow—eighty bodies to go yet. One really curious thing."

"Oh?"

"Endorphins. After seventeen years, in the brains of the ones that weren't burned, evidence of endorphins. Mike, some of these people died happy. Really happy."

Mike felt a chill—and not from the slight breeze. Think of something else, he told himself. "Crazy moon. Sits there on the horizon like a big tit. Never goes anywhere."

Nadine grabbed him, released the fasteners of his suit, and began to take it off.

"Hey," he laughed. Nudity was no problem; the two people who had brought swimsuits along had quietly abandoned them on reaching the planet. But lovemaking, Mike thought, was a little more private, especially if you're in charge and didn't want to look ridiculous. What had gotten into Nadine, he wondered? She'd always been the shy one on public displays of affection.

"Nadine, I feel like someone's watching us."

"Please. Shut the surveillance off if it bothers you. But please. The bones, the corpses, the heat, all the bones . . . Mike, I need you."

He didn't resist—in fact he cared too much about his best friend and lover to deny her. His coveralls dropped to the rock as her warm sticky body rubbed against him.

Then she pulled him down on her.

"Your back," he protested. She was lying on the raw lava of the hilltop.

"It's OK; it needs scratching. If I get a scrape, I can fix it. I'm the doctor, remember." She giggled. "I want you, lover. Here and now."

Then her mouth was on his, precluding further argument.

Nadine's back, indeed, looked like she'd been lashed when they were done, but she didn't seem to mind even when they dressed. Mike had to insist that they go to the tiny infirmary. People looked at them as they passed and smiled. Was their recreation that obvious, Mike wondered, or was he just imagining it?

At the infirmary, she gave him a clean towel and disinfectant spray.

"No anesthetic?"

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"No. I don't want it. That's strange, isn't it? Some people say sex acts as an anesthetic. An endorphin thing. Ah, rub there."

The lacerations "there" were deep, with grit still in some of them. "Nadine, that's raw flesh."

"Do it," she demanded.

"Monitor," he said. "Show Dr. Havel her back."

The clear space on her wall filled with a picture of her devastated skin.

"Look at that, Nadine. I can't rub that."

She looked confused. "No, of course you can't. But—but I want you to. It would feel good." She got a strangely puzzled look on her face. "Something's happening to me, Mike. My sense of pain seems to have been changed. I mean, it's still there—but I like it. Like a good itch, like I want to rake myself with something sharp and pointy."

Mike felt a tightness in his gut. "Nadine, when did you start feeling like this?"

"That should be my question." Her eyes said it all. Despite every test and every reasonable precaution, something was happening. "I don't know. I was hot, it might have been an immunological reaction. But we're all hot."

"Scary."

"I know, Mike. Look, maybe it's psychological. The people here died happy, and maybe somehow—I'm getting in tune with that. Empathetic." She laughed brittlely. "But, OK, I've got to put myself in the autodoc. Get fixed before this, this empathy gets the best of me."

Mike kissed her briefly and helped her into the coffin-shaped unit.

Before she lay down, she took his hand. "Mike, about Dena. I wish she were still with us, but whatever it was, I think she didn't suffer. I think I understand that now. I'm going to put mass hysteria, self-abuse, and sadomasochism on the sleep reader while I'm in here, and study up on it. I didn't think it could do this, but . . ." Nadine shook her head. "Maybe something in the environment—a combination of things that are individually benign. See you in the morning."

We've seen the face of the enemy, Mike thought as he watched the autodoc lid slide shut. In a few hours the battle would begin.

Hours turned into days. Nadine identified Dena's charred remains from bone marrow DNA, ending any hope—or fear—Mike had that she, alone, might somehow have survived.

As it became more and more clear how the colony had met its end, the level of tension had risen among the rescuers. People were looking over their shoulders.

Then they found the horses.

Toward the mountain end of the valley were a dozen waterfalls and sheer lava cliffs that rose vertically out of the alluvial plain. At one of those places, there was a slight basin filled with sand. It looked like a jumble of tree limbs on radar, but there were no trees.

Ian explored the site and found some bleached bones sticking out of the black sand. Excavation revealed dozens of horse skeletons, many with their skulls cracked. It was as if they

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had charged the wall full-tilt and died trying to butt their way out of the valley.

Dinner had been silent that night. No evidence of an alien presence showed up at all.

Back on the bridge, Mike stared at the holographic image of a very concerned-looking Rodrigo Cruz. He wanted to touch the man, and had to remind himself that Rod was some twenty thousand plus kilometers away, at the L4 point of Chip's orbit.

"We could bring another shuttle down, within range of the *Yeager*. In an emergency, we fly it out by infrared data link regardless of crew condition."

"Or," Mike said, "we could lose both shuttles. No, stay up there for now."

"Mike . . ."

"I mean it, Rod. We have no clue as to how this happened, but Nadine may have it. It seems biological, but all the life-forms we've found match their gene patterns stored in the colony's design plan, so we're baffled. Until we know more, you are to stay in orbit. Even if we start joyfully blowing ourselves to smithereens, stay up there. Because if you don't, you might take whatever it is back to Tau Ceti, and we damn well can't have that. Understand?"

Rodrigo Cruz nodded. "Order received. But Mike, if you go crazy, the discretion is mine."

"Chaos! I know that. But, Rod, if that happens, use your head. Don't stick my memory with another thirty lives!"

Or another planet, or a starship bound for Earth, or . . . Mike didn't want to complete that worst-case thought.

Rod looked down and brushed a shock of jet black hair from his brow. "Order received."

Mike sighed. "OK. Now put everything into searching for a survivor. The odds are small that we can locate him through the foliage, but it's our best chance of finding answers. And maybe solutions. *Yeager* out."

Silently, he called up a review of the data. It filled the wall—other pieces of the puzzle had come in: the personal effects of the colonists had been left untouched, except here and there where they had apparently been used as weapons of opportunity on each other. Food and water supplies proved to be free of poison, drugs, or biologicals. One maser transmitter had been torched, and the two backups taken out with axes.

Various discharged weapons were found all over the colony—many more than occasional hunting would explain. They had been made locally, by the colony's nano-replicator. Bullets, arrowheads, and crossbow bolts found in the bodies of some of the colonists matched the weapons.

In the main dormitory, the crew of *Yeager* had made perhaps their most disturbing discovery. One wall was covered with primitive drawings of stick figures dancing around a fire. One female figure was being carried into the flames by others. The scene was done in what turned out to be human blood. There was another blood painting of a dagger in a human heart, with one word: "Why?"

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"Psychotic art?" Mike asked.

Nadine shook her head. "Maybe an effort to communicate the horror of what they were doing, even as they did it. That's the last of the autopsies." She gestured to a holographic display over her lab bench. She was hollow-eyed and weary from ten days of intensive effort. "That woman burned to death, leaving charred bones and little else."

Mike regarded what was left of this body with revulsion. "I don't know how you keep going," he told her. "Have you slept at all?"

She flashed a quick, wry smile. "I dope myself down for four hours out of twenty, then dope myself up again. Don't look at me! Doc Bailey on the *Cochran* has been working just as hard." She sighed. "I haven't been outside for over a week. At least the work keeps my mind off . . . other things. I heard it rained today," she said with a weak smile.

"Just a shower. Prettiest rainbows I ever saw. The flowers smell like a dream."

"I don't dare dream, Mike. Corpse after corpse. These people deliberately, willfully destroyed their bodies while they were still alive."

Mike looked at her bleakly, and nodded. She was different, older, harder. It wasn't just tiredness; she hardly looked like the same person. She . . . "You've cut your hair."

"I wanted to do something, something really self-abusive. But I didn't dare do anything really significant. Not while I have all this responsibility. So I just hacked it away—butchered it." She laughed like a wicked child. "A self-destructive catharsis, and Harrison said he liked it!"

"You hacked pretty evenly, I'd say. Got it kind of tapered."

"I used the scalpel." She stared at him.

He pulled her from her chair and put his arms around her.

"Squeeze tighter, lover. It helps a little. Pain helps. I've stabbed myself twice, you know. Deliberately. Just for a release. Felt great. Almost like, you know—"

"Nadine!"

She made a hollow laugh. "I took care not to hit anything vital, and I'm taking an endorphin antagonist to dull the response now. But I'm walking a chemical tightrope. Too much and I can't think, too little and . . ." She looked into his face with haunted eyes.

He hugged her as hard as he dared.

After a squeeze that hurt his arms, she said, "OK, back to work." She pointed to a fractured bone in the video. "The left arm—two of those bones had been broken at least a week before she died. She was right-handed."

"Why didn't they tell us?" Mike asked, rhetorically more than anything else.

But Nadine answered. "I think they were ashamed."

"Ashamed?"

"Suppose itching, or maybe sex, became fatal, but we couldn't stop doing it?" Nadine looked at him. "Sex was really dangerous once, you know. People died in childbirth. Then there was a fatal sexually transmitted virus

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that fed on the immune system itself. People did it anyway."

He looked at her, remembering.

She flashed a smile at him. "Have you looked at the data stick we found in the computer room yet?"

Mike shook his head and grimaced. "Damn. I forgot I had it." He patted his coverall pocket and found it. "Here. Since Ian found the graves it's been one thing after another."

Nadine touched his arm gently and motioned to her reader. Mike dropped the wand in the hole.

"Left wall," Nadine said. "Let's see the last thirty minutes."

A monotone holographic image sprung up in front of the clinic wall screen: a half-sized view of the colony's central data room, then intact, and two occupants walking eerily in front of the screen like ghost images. The maintenance surveillance record was silent—a privacy constraint—and of course, its subjects were now "ghosts."

Mike froze as their appearance sunk in. They looked like primitive aborigines, naked except for tattered shorts and an unbelievable number of rings and other things piercing their bodies—noses, ears, biceps, lips, everywhere. They were caressing each other with an almost crazy intensity, tearing at their adornments as they did, and blood flowed freely. Mike shot a look at Nadine. Her eyes were wide with horror—or fascination—and oblivious to him. He touched her arm.

She nodded slowly. "In my considered medical opinion, they're having fun. Maybe too much fun."

The man fell to the floor, clearly exhausted, and said something. The woman shook her head and kissed him. He spoke again, seeming to plead, and she finally nodded. Suddenly the man flung out his arms and yelled what was clearly: "Now!"

The woman took a knife from somewhere, held it high, then brought it violently down. Nadine stared. Mike turned away.

When he turned back, the woman's image stood over a mutilated body, the knife still protruding from a mass of gore in the abdominal area. She cried and laughed at once, grinning, almost prancing around the room, raking herself with her nails. She went to the optical interface shelf and, one by one, pulled the CPUs off, threw them on the floor, and began stomping on them. White bone shone through her bloody, shredded feet before she was done with the third one. When she took the fourth, the record went blank. Without regulation, power had shut down. Mercifully.

Mike shook his head, shuddering. "We'll have the *Cochran* play back everything. There may be some . . . clue."

Nadine shivered, but seemed fascinated as well. "I think she wanted to protect us from knowing. But why is she so happy? Why the endorphins?"

"Madness?"

"That's the symptom—what's the cause? Got to be biological," Nadine whispered. "You don't want to be cured. You want madness to run its course. That utter destruction gave them an ecstasy literally worth dying for. She wanted to keep us from

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knowing what—what I'm beginning to feel."

"Nadine . . ." Mike put his hands on her shoulders. "I don't want to lose you."

She grabbed his hands hard and dug her fingernails into his skin. "Then join me," she whispered.

"Nadine!"

She sat silent for a minute at least, breathing deeply. Then her eyes shut a moment, and Mike watched as she called up the hologram of the autopsy statistics. In an unsteady voice, fighting for detachment, Nadine started to go over the results. "Thirteen of the bodies were immolated."

Mike nodded, grimly.

"All women," Nadine continued. "It matches that ritualistic scene in blood on the dorm wall. I'd guess the women wanted it that way, more tactile, more feeling in our skins. With the guys, it's deep wounds. Bones with knife scars made during life. Bones shattered by gunshot. I'll bet a bunch of them just walked up to each other and blazed away at ten paces. They deliberately didn't shoot to kill; there are too few gunshot wounds here that would be immediately fatal in and of themselves."

Mike looked a question.

"It might be something very deep, biologically, say a retrovirus that somehow cross-wires some aspect of human nature." She shivered. "The missing body belongs to Ken Shanks, the chief biologist and genetic engineer. Everyone else is accounted for."

He shrugged. "If that video is any clue, he probably killed himself, too. Scavengers would have dispersed the remains. Shanks . . . the name sounds vaguely familiar."

"It should. His parents knew your sister; they were on the advance team that came to Griffith eleven years before the colonists. They brought him along, and he was already a prodigy—doing graduate-level work in his teens. He's got to be the key—among all the colonists, he had the best background to protect himself from a retrovirus."

"Or make one?"

Nadine shuddered. "Maybe, but what an awful thing to make! And there's no trace of it. Except, maybe, in me. I'll know tomorrow—they're going through my blood scan in the *Cochran*. Time for me to go to sleep, now," she said abruptly.

"Just remember that what's happening isn't you. Your duty is to fight it and keep going—until we can fix it."

"Sure."

Ian looked worried. "Thanks for coming, Mike." It was late evening, more sweltering than usual—the rain was still steaming from hot tarmac and black volcanic rocks. Ian had his coveralls open to his navel and was sweating freely. That was the compromise most of the ground party had made between heat and security.

"No sign of Shanks?" Mike asked.

"That's why I called you. Sometimes I get the feeling that we're all being bloody well watched."

Mike grinned. "Me, too, occasionally. Watched by the ship in orbit. By our surveillance robots. By all the cameras we've scattered around."

Harrison looked up at the sky with

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mock resignation and back down again. "Quite. Well, what I'm feeling goes a bit beyond all that, I'm afraid. . . . About this time yesterday afternoon, after we finished getting the bodies stacked in the freezer, I went outside—just to breathe fresh air before turning in. You know those trees east of Boot Hill? I could have sworn I saw eyes in the bushes, looking at me. I blinked and it was gone. When I've been near the woods I've heard twigs crunch. Nothing big enough to crunch twigs left on this island but people, is there?"

Mike nodded. "What do the cameras show?"

"Cameras and overheads can't bloody see through trees, can they?"

"Someone taking a leak?"

"Skulking in the woods, with the bugs, the mud, and without their comm badge?" Ian gave him a wry grin. "Damn sight more trouble than using the loo would have been."

"Then?"

Ian shrugged. "We could sidle up to the edge of the wood like we're looking for something in the clearing, cameras on us, and if he shows again . . ."

Mike nodded. Once seen and identified, their surveillance system should be able to track whatever Harrison had seen, even if neither of them were able to catch up. "OK. I'll give it an hour."

Ian nodded, motioned toward the muddy clearing. "At least it's stopped raining. . . ."

Epsilon Eridani had finally set behind the central mountain, leaving the sky a still brilliant blue, but the ground deep in shadow. They made a show of getting out their flashlights and scanning the ground while taking quick and furtive looks into the even darker wood.

Mud stuck to their boots. They were nearly overwhelmed by the stink of the ubiquitous rain-soaked Wendy flowers. Mike didn't expect to see anything in the mud—so it took him a couple of seconds to realize it when his flashlight outlined a bare footprint.

"Chaos!" he finally choked out. "Ian!"

Ian came over and looked at the patch of ground illuminated by Mike's flash. A complete human footprint, and parts of several others, were preserved in the mud by the base of a tree.

"Who the hell would be going barefoot?" Mike's tone was casual, but inside he felt something cold and hard forming in his stomach. So it was Shanks, after all. "He's not wearing shoes and not carrying anything else radar could see through the trees, so he doesn't show."

"Well, his bones," Ian said, his manner matching Mike's outward calm, and the tension in his voice matching Mike's inner anxiety. "But among the tree limbs, they wouldn't register." Ian looked to where the footprints vanished into the forest. "I'm no tracker. . . ."

Mike nodded. "Me neither. I'll have *Yeager* send a couple of surveillance motiles." Human pattern recognition was better, but the ship would miss less detail. He brushed some orchids out of the way to give his helmet cam a better look. But before he could link

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to the net, it linked to him.

"Mike, Kay Singh," the voice said. She was tense, fighting for control. "Alonsis Mutera and Todd Silvany have just killed each other. With knives. The *Yeager* got it on the surveillance camera, but we didn't realize what was happening until it was too late. They looked like they were playing, having fun. Then all their blood and . . . insides . . . started coming out and we sent a surveillance robot down to trank them—but it was too late."

"How many people have seen that?"

"Only myself and the duty crew, so far."

It was Mills's shift, which meant Roger and Ann as well. Mike felt a sudden hard sting on his wrist. He swatted and pulled a large crushed, wormy thing from his sleeve. "Find Jensen, Kay. Ian's here and I'll tell Nadine. No rumors, OK? And if anyone else starts feeling these, these urges, they need to see Nadine immediately."

"Copy. Kay out."

Mike turned to Ian. "Mutera and Silvany just killed each other before anyone could do anything."

Ian looked down and up again. "Nadine will need the bodies, Mike. I'll tend to it." Then Ian looked at Mike's hand—he was still holding the caterpillar. "What's that?"

"Damn thing bit me. . . ." Mike said. "*Yeager,* any record of Mutera or Silvany complaining of insect bites? Caterpillar bites, specifically."

"Everyone on the planet," the *Yeager* reported, "but you, reports at least one bite, usually in connection with picking Wendy flowers."

"A caterpillar?" Ian stared at the oozing corpse. "Not supposed to be making a meal out of us, is it?"

Mike shook his head. "You're right, Ian. The insects matched their base templates, and engineered insects weren't supposed to bite people." Then again, colonies aren't supposed to disappear either.

"It might be a mutation, or a freak."

"Yeah, fourteen years and no corrections. Artificial ecologies need a lot of monitoring before they get all the bugs out." Mike grimaced at his unintended pun.

Ian raised an eyebrow, "So 'as built' doesn't match the plan. Wouldn't be the first time in engineering, would it? Or do you think it might be deliberate?"

"Sabotage? Back that far?" The pain of the bite faded and he shivered again. Was the bite toxic itself, or just a vector for a retrovirus? "*Yeager*? Mark me down as bitten. The thing that just bit me looked something like a caterpillar, at least it did before I smashed it."

"I'll send a robot over for it," the ship told him.

"Warn everyone to keep hands and wrists covered, and keep their hands off flowers." Mike turned to Ian. "If the footprint belongs to Ken Shanks, I think we need to find him. Soon."

But it was well past noon the next day before they picked up the trail of footprints. Mills and other crew members with experience in hunting and tracking watched through Mike's camera, asking him to look at this and

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that—broken twigs and depressions in the dense mat that covered all but the largest lava boulders. Everyone agreed they'd trade a bath and a cool night's sleep for one good dog. Ian followed Mike, safely out of sight.

After a few minutes of walking, Mike found himself in higher, denser wood. A glimpse of white caught the corner of his eye.

Pinned to the tree with a knife was a note handwritten in large block letters on the back of a ration envelope. Mike carefully scanned his camera around it before freeing it from the tree.

IT'S NOT MY FAULT THEY ALL DIED. I KNOW WHAT DID IT. 'HOW DOTH THE LITTLE BUSY BEE.' I'M NEARBY AND I'M WATCHING YOU.

Instinctively, Mike's head spun left, then right, but he saw nothing. The brush was still too dense—too complicated. A gust of the evening wind ran through the forest, rustling leaves and making boughs creak like a rolling ship. For the second time since he'd arrived on Griffith's World, Mike felt a chill.

WHOEVER FINDS THIS, IF YOU ARE ALONE AND WANT TO HEAR THE TRUTH, WALK NORTHEAST AND KEEP WALKING. DON'T PICK THE FLOWERS.

—DOCTOR KENNETH SHANKS

"We've figured that out, damn you," Mike muttered to himself. He suppressed the urge to pat the smooth bulge of his hypersonic needle gun, and jammed the knife back in the tree, perhaps harder than necessary—it didn't really hurt the tree, he felt—for all he knew, the trees here would like it.

He linked his data back to Ian and pressed on through brush, fallen logs, and dead needle-covered black lava boulders that looked like so many skulls.

"Don't turn around. Got you covered. You—you hear me? You understand me, huh?"

Mike froze. The voice was a man's, though uncertain, high pitched, and cracked. "OK," he answered. "What happens now?"

"I'm not go—going to kill you. No. Why should I?"

Mike fantasized about being shot, with needles tearing through his flesh. Chaos. It was happening to him already.

"Take your gun out and toss it far . . . far away."

Mike calmly did as he was told. "Dr. Shanks, I presume," he said with an ironic smile at the historical allusion. "Will you come out now?" Shanks was the key, he was sure of it. But he would have to handle this very carefully.

Shanks walked around from behind him. His hair was matted and fell down to the middle of his back. He was naked, deeply tanned and moved his spare frame in quick little jerks. A full, shaggy beard obscured his face but brought attention to his wild eyes. Those eyes darted around and failed to meet Mike's. Shanks had been bluffing—he was unarmed.

A vague feeling of disappointment passed through Mike, but his mind snapped to the problem at hand.

"Very well, Dr. Shanks. What's your story?"

"You read the note?" He gave a kind of crazy laugh. "'How doth the little

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busy bee/Improve each shining hour/And gather honey all the day/From every opening flower.' Do you know it?"

Mike nodded. "It's from Isaac Watts. My older sister taught it to me when I was a boy after I got stung by a bee."

"What did it mean to you?" Shanks seemed suddenly very grave, as if this were extremely important.

Mike tried to answer seriously. "Stings are part of life. The bee can drink from the flower with impunity, but if you stick your nose in, you get stung. Pretty doesn't mean safe? A decoration for us is a job for a bee? It's poetry, Shanks—it means whatever you read into it."

Shanks stared at the ground, fidgeting. "It wasn't the flowers; it was the caterpillars, but death came from every opening flower that spring." His eyes went wide. "Death! Insane death!" Shanks chopped a hand toward a fallen tree. "Sit down. You'll listen, won't you? You'll listen to me?"

Mike sat. Ian should catch up to him soon.

"It's not my fault. There was a mutation, don't you see? There had to be. We couldn't find it and couldn't fix it." Shanks's agitation seemed to recede a bit, his voice losing its edge.

"Maybe if you just tell me about when it started. . . ."

Shanks sat down and said nothing.

Finally Mike said, over the sounds of the darkening forest, "You had a suicide epidemic?"

Shanks took a deep breath and nodded sharply, ripples running down his long hair.

"I didn't know what was happening at first," Shanks blurted. "People got itches and scratched themselves raw. Bhenaz and Nicci, two of our systems engineers, went crazy with body piercing—without anesthetic. Another couple hacked each other to death.

"President Tams didn't want to spread panic so she put out the word that they'd apparently taken a marital dispute over the top. We put the bodies in bags in the food cooler. She quarantined the data—kept it on planet—didn't want people to think she was responsible for a murder-suicide epidemic. I begged Tams to send the data out. I—I knew something was very wrong."

"I'll bet you did. What was wrong, Shanks?"

"No!" Shanks sprung up, hit a tree with his fist, and spun around waving his arms wildly. "I can't—I tried— It's not my fault!"

"Take it easy." Where was Ian? Mike asked himself silently.

Shanks looked into the forest for a moment, then sat back down. "Bhenaz and Nicci told me—they said if it ever got out about how good this was, the whole human race would kill itself. They were nuts by that time, of course. But they had the codes. They inhibited the orbital systems so the AIs wouldn't interfere, trashed the data, and then trashed themselves."

"Go on."

"Pretty soon I was the only sane one left. Ha! Their minds . . . they made play of it—re-created savage anachronisms; vivisection, human sacrifice, swordfights, gunfights, eating each other alive. Do you know what

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that's like to watch when you can't—do anything about it?"

Mike shook his head and suppressed an awful thought. No, he had thought it. He had wondered about what being eaten alive felt like and the idea had excited him. He needed help. Later. "You said the caterpillars then, not the flowers, were the vector?"

Shanks bobbed his head, and looked like he was going to cry. "We almost had it under control. Just keep away from the flowers. Then, then—the springtimers bloomed."

"The what?"

"The adult form of the caterpillars. They're based on a cicada—the seventeen-year locust of Earth. Mom and Dad designed them. They look like crickets except when they fly. Then they look like butterflies. We named them springtimers because of when they hatch, that's when the really warm season sets in here, about now. They were hatching out of chrysalises by the thousands. This was their first appearance—it was supposed to be kind of a surprise for everyone. I was in on it with Dad and Mom.

"The Wendy flowers are named after Mom. Several insects attach chrysalises to them, including the springtimers. The imago—the adult springtimers—were plectoptera but had characteristics of the lepidoptera on Earth—a stable genetic chimera we made by loop splicing, mostly on the J-457 morphobehavioral set. You don't know bug genes—I can tell by your face."

Mike felt a momentary sense of disconnect, being lectured in esoteric entomology by someone that to all outer appearances was a wildly crazy naked person.

"The first time the imago came out, they started biting everyone, just like the caterpillars."

"So everyone got it. Why were you spared? What made you immune to the insanity?"

"I don't know!" He half rose, then sighed and sat down again. "Dena didn't know either. We had . . . a thing, until this happened. Then, a few days after, I began hiding out in the forest. I watched them get ready to burn her alive. They were making a big ceremony of it. I tried to save her. They came after me and I started shooting. They laughed. I kept shooting and shooting. I couldn't stop. . . . When they were all down, Dena walked over to me—they hadn't tied her up or anything. I should have known she didn't want to be saved."

Mike buried his hands in his face for a moment. He remembered taking his little sister on walks. He remembered her big brown eyes and trusting hugs. A bird chirped, and a gentle breeze brought the incongruous scent of plumeria. Dena had loved flowers.

Mike glared up at Shanks. "Go on." Get the information, he told himself. Then kill the bastard.

Shanks looked as if he would cry. "She told me not to worry, kissed me, and while she kissed me she took my gun. Then she grinned at me and started walking backward. Back to the fire.

"I tried to come after her, but she shot at the ground in front of me. Then she threw the gun down and walked into the fire herself with her arms raised up like this." Shanks lifted

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his arms, opened them as if in some kind of religious ecstasy, and shook. "Crazy! Everyone was crazy! I couldn't fix it without her. It wasn't my fault!" he sobbed, looking spent.

Mike thought about the fire, the beautiful fire. Sis, was it so good? So good that you would forgo everything else that might ever happen to you for that one ultimate experience? He imagined Dena saying, *It was wonderful, Mike. It was OK. It was all I ever needed.*

Time to make my move, Mike told himself. Easy does it, don't do anything threatening. Lose Shanks and we lose our hope for a cure and a planet. "You look like you could use a shower and a good meal. . . ."

Shanks jumped up in an agitated way, seeming to struggle with himself. "I've told you all I can!"

Not by a long shot, Mike thought. He struggled to keep his hands down. "Please take it easy, we . . ."

"No!" Shanks suddenly turned and headed for the brush before Mike could stop him.

Ian burst out of the trees. "Hold it!" he yelled, gun in his hand.

Shanks screamed and tried to find cover, but the brush in the forest wasn't dense enough to cover him completely. Ian stood still and raised the gun steadily. He tracked for a moment, then Mike heard the electric snap of its discharge and the round flew to its target.

Shanks gasped, fell to his knees and, at last, began to weep with abandon.

"You all right, Mike?" Ian asked.

No, Mike was not all right, but he took a deep breath. "Yeah," he said.

They made their way to Shanks, hoisted the now inert biologist on their shoulders, and carried him back to the settlement.

Mike went to the infirmary for an exam. He had it now himself, he was sure—another data point.

"Any luck?" he asked Nadine.

Nadine nodded. "The *Cochran* people checked out as much of Shanks's story as they could. It's accurate as far as it goes. Working back from the autopsies, I think I've found a retrovirus. I don't know what it does yet, but there's DNA in these people that doesn't belong there and it matches some new DNA in me, too."

"How does it spread?"

"Probably by anything that gets past the skin. A cough, a shared glass, sex. I'll order increased hygiene and abstinence. We've all been exposed already, but it may take repeated exposures. I wonder how it starts if no one is infected to begin with—what's the vector?"

Mike scratched his head. "People that get bitten by caterpillars get it."

"If it's a caterpillar virus, how can it affect people?" Nadine asked. "There are three of them in the data base, but none of them affects people, according to their description."

"According to genetic design descriptions, the caterpillars don't bite, either. What about mutations?"

"That's two mutations, Mike, and each of them a hell of a mutation!" She pursed her lips. "Shanks might have made the caterpillars bite, and the virus may have mutated. Or the caterpillar virus may do nothing more

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dangerous than cause a wart—and then all the craziness is caused by something else."

"He knows more than he's told us. I'm sure of it. He might have made this retrovirus and shielded himself while it did its work. Is your virus in the springtimers?"

"How would I know that?" Nadine snapped. "I just found it in the human victims!"

"Sorry. Nadine . . ." He reached for her and she fell against him. She'd lost a lot of weight, he noticed, and felt as if she were made of paper. He held her for one minute, for two. "Just asking. We had the *Yeager* collect the one that bit me."

"Then I'd better get back to work," Nadine said and made a short, rueful laugh. "But, Mike?"

"Yes?"

"If I have to go, I'd rather it were fire than overwork."

Mike put a hand on her shoulder and dug his nails in, just a bit.

She smiled, with the hint of a tear in her eye, then brushed his cheek with her lips.

Morning came early for Mike, long before Epsilon Eridani rose. Astronomer Kay Singh had found Sean Peterson, their ecologist. Singh had reacted coolly and quickly, calling Ian and Nadine. They and the robots got him into the autodoc still alive.

Mike saw the man in the infirmary and was headed back to the settlement when he ran into Ian. Ian was carrying a Wendy flower with a chrysalis.

"How?"

"He tore his flesh with a scrap of metal in a clearing out of sight of the overheads and then lay down where the crows would finish the job. It would have worked except that that was just the kind of place Kay likes to put her sky-scanners. He was still conscious; we had to trank him. He was quite put out with us, you know—begged us to leave him alone."

Mike tried not to think about it, unsuccessfully. To surrender yourself, piece by piece. To savor each tear, each cut. . . .

"Mike?"

"Ian, we all have it. It's just a matter of time."

Ian studied Mike for a moment, then cleared his throat. "Well. We put our hope in the medical staff, then, don't we?"

A chill went through Mike. Of his ten people, Mike realized, two were already dead, one was badly injured, and at least two of the remainder were showing bad signs: Nadine and himself.

"At any rate," Ian continued, "I will lay odds that this—" he pointed to the chrysalis, "—is a springtimer chrysalis, and not something else. So in a few days, I'll wager the air will be full of what comes out of these things."

"Isn't it a little early? It's only been fourteen standard years."

"Bloody right, Mike, but that's seventeen seasonal cycles here. The flowers are so pretty. Can hardly help but pick them, can you?— Get a little high out of it when the little bugger bites you, no? And each bite adds a little more of whatever it is—a bloody positive feedback loop."

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Mike looked at him. "You too?"

Ian looked grim, but said, simply, "You know, it's curiously hard to admit, even after all that. Well. I'm handling it rather well so far, aren't I?"

Mike nodded. "Let's get some of these pupae back to Nadine. We need to find a cure for this."

"While we still want to," Ian remarked, softly. He looked away, toward the hills. "If we can't find a cure, we just might still save the planet by getting rid of the bloody things, right?"

"Right," Mike nodded. Even if it couldn't do his crew any good now. "*Yeager,* what did they do about bugs before genetic engineering?"

"There are chemicals that are significantly more toxic to insects than other things. They will hurt the ecology generally, however."

Rod can pick up the pieces, Mike thought. "Can you make them out of local materials?"

"Yes," the shuttle's system replied, "the air motiles could deliver the chemicals to the affected area as a fine mist in a couple of days."

"Do it."

"You think that's the vector?" she said, looking at the pupae. "If so, we could take some of the flowers with attached chrysalises, put them in cold storage, and eradicate the others," Nadine suggested.

Mike pursed his lips. "We could get out of here, put ourselves in cold sleep, and let the people with the big facilities work the problem and cure us when we wake up."

Nadine shook her head. "It's not that simple. We don't know that the virus in the caterpillars is what does it, or that eradicating it solves the problem. All we've got so far is correlation—not proof of cause and effect. We agreed this job was worth doing, worth the risk. Let's finish it."

"At the cost of how many more lives?"

One look at her face told him that remark was a mistake. "Sorry," he said. "Look, one more day. Demonstrate causality if you can, and I'll try to get something more out of Shanks. Then, if we don't have a clear path out of this, we get out, OK?"

"I guess," Nadine conceded.

"Nadine, we've had two violent suicides and a third attempt. Half of us are quietly hurting ourselves one way or another and fantasizing about volunteering for the inquisition. We need a cure."

"Mike . . . Shanks could be innocent, you know?"

"How? Didn't he hide for weeks and then try to run when I pressed him? He's guilty as sin!"

"That could be a natural reaction to being alone for years. And he must have known he'd look guilty. Let's assume his story is valid for a moment, that it is a mutation. Shanks could just happen to be immune. That's the nature of human biology: no matter how virulent a substance is to the human body, you'll always find someone who can take it."

"That's too broad for me," Mike said. "Enough cyanide will kill anyone."

"'Enough,' Mike, is the operative word. When it comes to germs, virus-

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es, venom—the level of tolerance can differ dramatically from person to person."

"In theory, sure. But to believe Shanks happened to be immune out of such a small group of colonists is stretching things. And why didn't he save a specimen of an imago? He's a trained biologist. You'd imagine he'd think of that."

Nadine shrugged. "So we go back to Shanks as a psychopath. Get the psych program to evaluate his sanity—which I would suspect isn't too good after all those years alone on this planet." Nadine turned to him from her tiny desk in the *Yeager*. "I think the effect of the virus is at least partly psychological, too: Skinnerian."

"Who?"

"B.F. Skinner—a twentieth-century behavioralist. He claimed you could be conditioned to do almost anything with a suitable set of rewards. I think that's how the virus works—it makes our bodies reward physical trauma with endorphins." She shrugged. "Maybe there needs to be a place like this, for when people get tired of living forever. It might not be that bad a way to go, would it? I mean we all go sometime, and why not make a joyfully messy splash of it on our own terms, rather than waiting for a rocket engine to fail, or a meteor to come along some year?"

Mike looked at her sharply, but she seemed under control. "I guess," he said, with forced casualness. "Nadine, I'd hate to see Dena's whole world marked 'off limits' and wasted for decades because we can't nail down one retrovirus. Can we build a countervirus based on what you have now?"

"Difficult, Mike. That's very difficult. Even with three of us and all the *Cochran's* brains working on it, it's going to be hard to find; and I can tell you right now, Dr. Bailey doesn't want anything physical coming from us up to orbit."

Mike stared at her and laughed ironically. "What's he afraid of? It feels so great to stick yourself."

She grabbed his left arm and exposed the underside where he had been sticking pins in it. "I'm going to put everyone on naloxone—it's an endorphin antagonist, blocks the receptor sites. Trouble is, this will take the edge off everything, and make us more irritable, and vulnerable to depression. You can't do just one thing. I don't dare give you too much. Sorry, Mike."

"No argument. Just don't make a zombie out of me. And get everyone else in here, too. We don't want any more of that," he jerked a thumb toward the auto doc and what was left of the barely living Peterson. "Suppose Shanks did it. He'd know how to undo it, wouldn't he?"

Nadine shook her head. "I would guess that he wouldn't, or he would have done so. I would guess that he blundered and doesn't really know how to undo it, or he would have fourteen years ago. But we could—I think—if he could tell us what to look for among those billions and billions of base pairs."

Mike stood. "Let's call it a night, Nadine."

"That quote about the flowers . . ."

"What about it?" he asked.

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"Is it the ravings of a madman—or a biological saboteur trying to appear like one?"

That night, in his settlement room, Mike reviewed everything their library had on the original survey team. He skimmed tens of thousands of kilobytes of technical data on Shanks and his parents, looking for something.

Carl Shanks, his wife Wendy, and their son Ken had spent an entire year fabricating the Griffith's World genomes. Carl Shanks kept a personal diary which became an addendum to the team's official report. Mike read the entire file. Everything seemed normal—no difficulties, no reservations.

Something was missing, he knew. Something right in front of his nose. What kind of mutation? No! The genomes matched the design—there was no mutation, at least not since the final genome was recorded. So it happened *before* the final genomes were recorded. Shanks had had access.

In a minute, Mike was out his door and down the hall to Shanks room. He overrode the entry control and barged in without warning. Shanks was watching his wall screen.

"Shanks! We need to know what you did with the springtimers, how you did it, and when. I'll need to record this."

Shanks froze, and continued to look at the wall. "It wasn't my fault," he said. "Mom and Dad did the springtimers. I was just a kid, then."

Mike tried again. "We tested the pupa. There's a retrovirus—"

"I'm accidentally immune!" Shanks insisted.

"You ran."

"You were carrying guns! I thought no one's going to believe me after all of this: they'll want revenge! They'll want to kill me for this. I guess I knew I'd look like a murderer or worse. I was scared, damn near par—par—"

"—Paranoid." Mike supplied the word. Ironically, the last time he'd heard it was from Nadine, applied, loosely, he hoped, to himself. If your fears come true, he wondered, are you suddenly not paranoid?

"I hadn't," Shanks continued, "interacted with a human being for fourteen years. I was—just out of practice, afraid. So I left notes, what I thought were clues, and ran. It seems nuts, but I wasn't thinking well."

Mike nodded, anger fading. Let him talk, Mike thought. Maybe he'd work his way into something. "What kept you going all these years if you didn't expect any rescue?"

For a moment, Shanks acted as if he didn't understand the question. Then he looked into the middle distance. "Instinct, I think. It's damn hard to die, unless, inside, you really want to. You keep solving problems, keep eating, keep drinking, keep breathing. You can always die tomorrow."

"Why didn't you save any adult springtimers? Weren't you curious? Didn't you expect questions if rescue came?"

"They only live a few weeks. Everything was going crazy and I just didn't think. . . ." Shanks cradled his head in his hands. "My lab was useless without power. Anyway, I was the insect expert. Dena had a better handle on human biology. I never thought any-

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one would come for me. I lived day-to-day."

"But you saved the bodies. Bagged and buried."

He nodded. "The colony fell apart without the robots—no refrigeration—so underground was the best place for them. Cool, thermally stable. I couldn't get a message out and I didn't want it to happen again to anyone else. I couldn't fix it, but maybe someone who came later could. At least you'd know what happened. Was Mom still alive when you left Tau Ceti?"

Mike was taken aback for a moment, but he'd spent a good part of the night reviewing the records. "She's teaching at Alexigrad University, on South Continent." We should have brought her, Mike thought; hindsight was perfect. "That quote from Isaac Watts? Why'd she teach it to you?"

Shanks shrugged. "It's from 'Against Idleness.' She said I should use it on Dad the next time he accused me of being too lazy to finish my own work. One bee, lots of flowers."

Mike thought that one over for a minute, trying to fit it in with the diary he'd spent the night reading. "Weren't you sick once? Your dad mentioned it in the diary; he thought you were malingering."

"That was when my mother taught me the quote. . . . I was in bed and had time to read." Shanks's eyes widened. "You see, I'd been transplanting some of her flowers from the forest when one of the caterpillars bit me. I had a reaction."

"They aren't supposed to bite, Shanks. Why do the caterpillars bite?"

He stared at the floor. Finally he said, "To protect the Wendy flowers."

"Your parents didn't do that, did they? If they had, it would have gone through the review process and been documented."

He looked away for what seemed minutes, then sighed. "OK. Mom kept saying the flowers were so pretty they'd have to be protected, or people would pick them. So I took some genes from the collared peripatus and made a small modification. Just that and inactivating the code that keeps insects here from biting large animals. It bit, all right—I was down a few days. It was an idiosyncratic reaction, an accident, don't you see? That's all. I didn't plan to be immune to a plague I didn't make!"

Mike shook his head. "You were also a boy genius, and creative. It hurt you and you wanted to fix it, didn't you? So you did something more."

Shanks looked away.

"Please," Mike pressed. "We need to know what you changed. There are lives at stake, which, if we were in our right minds, we would want to keep. Do you want to go through it all again? The blood? The graves? It wasn't a mutation; it was something you engineered, wasn't it? Before the genome was recorded. What? How?"

Shanks stared at the floor.

Mike tried again. "Nobody's going to hurt you, Shanks; it's gone well beyond anything that can be fixed by punishing you. Dena would forgive you, Shanks." Like hell, he thought. But this wasn't the time to stand on accuracy. "She was my sister, I knew

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her that well. Do it for her. Tell us."

The revelation got Shanks to talk. "Your sister? God, I'm sorry."

Mike waited.

Shanks's eyes pleaded.

Mike stared.

Finally, Shanks said, "Yeah. I . . . made another little change—something to take the sting out of the bite. I found a virus in the insects' saliva—normally, it doesn't touch people. I changed its protein sheath to let it survive in human blood and made it soluble in lipids to get it past the blood-brain barrier—like it was food. That change didn't show up until the second generation. It worked fine on my computer models, so I slipped the code into the gene design data base.

"The virus doesn't lyse brain cells, but once in there it drops the code I made into the genes of brain cells it infects. Usually it does nothing, but in the back of the hypothalamus, it causes synapse growth between pain, smell, and endorphin cue areas, so that when something smells good, pain feels good."

He shook his head and there were the beginnings of tears in his eyes. "It just releases a few endorphins if you get bit when picking a Wendy flower so the bite doesn't hurt so much. It doesn't block pain—you still feel it. You just interpret it differently.

"The adults aren't supposed to bite. There must have been a mutation of one of the seed stock before we scanned the final genome. A very simple one—neoteny, the retention of some juvenile characteristics. In its descendants, the adults still bit people."

A mutation? No, Mike thought, an error. He paused for a moment, struggling with memories of Dena. For her sake, he had to beat this. "Did you try to exterminate them?"

He sighed. "We were all bitten before we realized what was happening. People stopped trying. They became addicted, literally addicted, to damaging their bodies. So did the horses and the other large mammals. Commander Tanner, you know what was worst?"

Mike shook his head. What could possibly be worse?

"All this ecstasy around me. People transported in joy as they destroyed themselves. And I couldn't be part of it, couldn't feel it at all. I should have died, too, for what I did. But I couldn't." He half laughed and half sobbed. "I was immune."

The frail, guilt-wracked survivor seemed more like a frightened man-child than a mass murderer. Mike thought of events of ages past—mass hysteria, witch burnings, cult suicides, thousands of people raising their arms and yelling, "*Sieg heil,*" people getting carried away with endorphin rewards when their minds knew better. How much, Mike wondered, was in Shanks's retrovirus, and how much was already there?

"Shanks, we can't bring back the dead, but maybe we can save our lives and this planet's ecology so that it can still be settled. Help us."

Mike waited the longest minute he'd ever waited in his life.

Then Shanks nodded slowly. "I'll work with you—tell you everything I remember." For Mike it seemed as if a veil had fallen away. Shanks's inflec-

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tion, indeed his whole attitude, seemed more adult.

"OK. I'm going to put you in touch with our medical people. They want to try to construct a countervirus."

Mike decided to let Nadine sleep and got Dr. Bailey out of his orbital bed. The conversation was far too esoteric for Mike to follow, but it sounded like Shanks and Bailey might be able to trace the changes he'd made as a teenager over two dozen years ago. Despite the importance, Mike was suddenly too tired to pay attention. When they were done, he went back to his room and fell asleep instantly.

The call came while Mike was deep in dream. He was a Roman martyr being shot full of arrows while tied to a stake, freed from his flesh to ascend. He grew lighter and lighter, joy spreading through him. . . .

"Commander, it's Harrison. Mike, Mike?"

"Yes—Ian. What?"

"I'm at the pad. Mills sealed himself in on the command deck, disabled the shuttle's computers, and says he's going to fly it manually and crash into the settlement. Fry bloody everything and everyone if the antimatter containment goes. I'm trying overrides through the old colony launch support system, but they're not compatible, so far. Or he's blocked it somehow. Bloody out of his mind, he is."

Damn, who wasn't? Kendu Mills had shown no sign of any effect. But, Mike realized, it was just human nature to fight admitting that something like this was eating away inside you, even to yourself. "Tell him it isn't necessary. We know what it is. We can fix it. Just hang on a few more hours."

"He's not bloody listening. Nadine is on board, too. Can't reach her either. I've three colony vehicles here, and one functioning brain—trying to pull it from the grader and put it in the fire truck."

"Copy. Ian, make sure Rod's getting the data, but tell him to stay put. I don't want him coming down. We don't know if Nadine's cure will work and I don't want to risk breaking quarantine until I know it does. See if you can't trigger some of the *Yeager*'s safety shutdown systems; they aren't all tied to the main computer. Mills might not think of everything in his present state. Ian, be careful yourself. Think everything through, because this virus ruins your judgment. You can't trust your feelings because your feelings will try to maneuver you into destroying yourself. Think it through!"

"Roger, Mike," Ian said, coolly.

Do as I say, Mike thought. *Not as I do.*

Wearing only his shorts, Mike slipped the comm set in a pocket and was out the door and headed to the launch pad on a dead run, leaning low to the ground to keep from bouncing in the moderate gravity. Warm air, flowery smells, and the still plaintive notes of some night bird gave the evening a surreal voluptuousness.

Out of shape, his lungs started burning, and that felt good. Every stone and thorn in the path under his bare feet gave him a little high as well. But the desperate situation helped clear part of his mind. His mission

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was in jeopardy. He and everyone else might have only minutes to live—but the pleasure of abusing his body nearly overwhelmed him.

Then he was there. Ian, surrounded by various tracked vehicles, panels, and tools, had managed to get a spotlight on the shuttle. Steam was venting, signaling that its mass converters were already coming up to temperature. The warning tone sounded: full thrust was imminent.

"I'll try to get inside!" Mike yelled, passing by Ian on a dead run and charged at the shuttle. His feet tore through, and were torn by, the overgrowth on the field.

He forced himself to think. There were at least three systems that would abort the launch if people were close. Mills couldn't have gotten all of them. Not that it would really matter if he had. Mike had no more fear of flame.

The hatch above the landing leg ladder opened. That should shut it down, he thought, almost disappointed. Nadine appeared in the hatch, carrying her black case, five meters above the ground, and started down the ladder.

"I have the countervirus!" she yelled. "Bailey cracked it and I replicated it. It works!"

How could she be sure without trials? Mike wondered, briefly.

The turbine whine increased—no shutdown. So Mills had been insanely thorough. Bless him.

Too late, Mike thought; it would end here. His responsibilities would be over and he could give himself to the flame of the rockets and dissolve in sensual joy. No. Not alone. Not without Nadine.

"Jump," he screamed at her. "Now!"

Nadine heard either him or the turbines and jumped the last five meters. Only two meters worth back at Tau Ceti III—survivable. She landed hard and rolled, then struggled to her feet and limped toward him through the vines and grass, clutching the bag to her chest, sheltering it with her body.

His legs were cramping from almost a kilometer of dead run. Thrills of pain ran through his legs. He was probably tearing things. It felt great, but he was slowing down. If he could only get to her, they could go together—no, save the countervirus. One of them might make it back.

She limped toward him.

"Get down!" he tried to yell. It came out like a croak from his air-starved lungs.

Five pillars of steam appeared below the shuttle and a deafening blast of sound hit him. The pressure wave struck and Nadine leaped, or was thrown, the last meter right at him. He pulled Nadine down into the blast shadow outside the rim of the shuttle's landing crater as the engine noise built to a deafening roar.

She screamed as an ecstatic wave of fire passed over them. He wanted the fire, but her body was in the way. He rolled her under him. The sample case fell to the ground within his arm's reach.

Why was she screaming? The fire was wonderful. It felt good . . . too good. The last vestiges of his suspicion, skepticism, and paranoia surfaced in his mind. Too good to be true. He reached for the sample case and pulled it under them as the fiery

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blast passed over them in earnest. To give others a chance, he thought, just in case this wasn't the way to paradise.

A torrent of cold water hit them, first stinging, then numbing as the roar of the shuttle increased to incredible, then diminished as it gained altitude.

Ian, somehow, had put a fire hose on them. He didn't understand either! Mike caught a glimpse of Ian, at the pad's edge, in the open cab of the fire truck, aiming the hose manually. He seemed on fire. No, perhaps Ian did understand.

Mike, bemused to be still alive, noted the contrast between the delightfully sharp cold water on one side and the equally sensual burning on the other. He knew he was a mess, but this had felt much, much better than sex had ever been. Nadine's face was a mask of intense emotion, but otherwise intact.

"Murphy's law," she gasped.

"Huh?" He stared at her dumbly. If only Ian would turn off the damn water. It was starting to numb him and he wanted more stimulation, he wanted to be consumed, he was delirious.

"I dreamed about getting burned alive for weeks." Nadine gasped. "But I took the countervirus to see if it works. It works, goddamn it. Mike, this hurts, God it hurts." Her eyes glazed over; she'd lost consciousness.

"Nadine?" He felt an awful chill of sadness in the midst of his ecstasy. He had wanted to share.

A scream above announced the *Yeager*'s suicidal dive on the settlement. So it would be over for everyone as well. Pull up! he willed. No problem though; the blast would be the peak experience for which all life was made. There was nothing anyone could do with the rest of their lives that would equal this. No!

But the shuttle's dive changed pitch. He looked up, surprised to be still conscious, in a kind of blowsy afterglow, with the cold water numbing his body, though even the shivers were pleasant. The shuttle had pulled up for some reason.

Curious. Had Mills changed his mind? There it was, carefully, hesitatingly moving sideways on its tail to the far end of the pad. Landing.

There was another roar in the sky.

Rod, damn him. Rod had disobeyed his orders, broken the quarantine, and come down in another shuttle. They must have taken control of the *Yeager* through some data link that Mills hadn't cut.

Commander's priority override, he remembered. Rod had assumed command. So Mills hadn't thought of everything. He felt the sample case under him. Not necessary, after all. Rod would have more. The colony was probably saved.

But he just wanted more fire. Why didn't Ian turn that damn hose off?

Mike was there when Nadine emerged from the *Eisenhower's* autodoc. It had her up to normal weight, and Mike, who had emerged from the *Yeager's* autodoc three days earlier, felt the effect was spectacular. But the effects of the rocket blast were not entirely gone; her skin was a patchwork of tan and soft pink, and

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her hair was a golden fuzz. He whistled, and handed her coveralls to her.

"OK on the outside. But, that was close, lover. Damn close. I feel a million years old inside." She gave him a brief hug, stepped into the one-piece garment, wiggled her feet into its boots, and touched the seals. "You look a little different yourself."

He smiled crookedly—he'd seen the video of what he looked like when he went in—then saddened. "Ian didn't make it. I thought I should tell you first."

She looked down for a moment, then nodded. "What's going to happen now?" she asked.

"We'll have a memorial service. I'm leaving Shanks here to work on undoing the damage he did."

"Alone?" She started down the ladder.

"Not quite." Mike followed. "Kay Singh is going to stay, too."

"With Shanks?"

"Yes. I'd probably stay in orbit—I'm not that trusting, myself."

"Thank goodness," she said. "If you hadn't been so paranoid about Shanks, we'd be . . ." She shivered momentarily. "Some people might want to get their hands on Shanks."

Mike shrugged. "I suppose another fourteen years of exile in a jungle with that—" he waved a hand toward the colony and Boot Hill, "—on his conscience for the rest of his life might do for punishment."

"It might." Nadine sighed. "Well, we did it."

Mike nodded. He felt curiously empty—the mission was done, the problem solved. "But we paid for it. . . . I hope it was worth it."

"Mike, I think historians would say this kind of thing is part of the price we pay for not staying home. To those who pay the price, goes the glory. Let's not demean it with cynicism."

He looked at her. She was serious—and, he realized, right. He nodded. Then they passed through the lock and waved to the crew below.

The crew of the shuttle *Eisenhower,* and the other surviving crew members of the *Yeager,* met them at the base of the shuttle's leg. An eternity of two weeks ago, Ian had rigged the colony replicator to produce what he called Scotch "fit for The Bishop's Table." Now, they found glasses of the amber liquid pressed into their hands as soon as they reached the ground. Mike sniffed it suspiciously, took a tentative sip, nodded, then raised his glass. "To all the people who became part of this world in the struggle to make and keep it."

"To Dena," Nadine whispered. Mike gave her a small, sad grin.

People cheered and touched glasses. Beyond them, Wendy flowers peaked through scorched earth and waved seductively in the wind.

Rest easy, Sis, Ian, Mike thought. *We'll finish the job.* ■

Intelligence sees how to. Wisdom sees when to.

—Gwen Ross

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Interface Masque, Shariann Lewitt, TOR, $23.95, 350 pp. (ISBN: 0-312-85627-X).
Alpha Centauri, William Barton and Michael Capobianco, Avon, $23.00, ? pp. (ISBN:0-380-975-114).
God's Fires, Patricia Anthony, Ace, $22.95, 311 pp. (ISBN: 0-441-00407-5).
The Howling Stones, Alan Dean Foster, Ballantine/Del Rey, $23, 331 pp. (ISBN: 0-345-38375-3).
3001: The Final Odyssey, Arthur C. Clarke, Ballantine/Del Rey, $25, 263 + viii pp. (ISBN: 345-31522-7).
Hal's Legacy: 2001's Computer as Dream and Reality, David G. Stork, ed., MIT Press, $22.50, 384 + xxii pp. (ISBN: 0-262-19378-7).
His Share of Glory: The Complete Short Science Fiction of C. M. Kornbluth, Timothy P. Szczesuil, ed., NESFA Press (P.O. Box 809, Framingham, MA 01701-0203), $27, 670 + xxiv pp. (ISBN: 0-915368-60-9).
In Search of Wonder, 3rd ed., Damon Knight, Advent, $20, 402 + xiv pp. (ISBN: 0-911682-31-7).
Three in Time: Classic Novels of Time Travel, Jack Dann, Pamela Sargent, and George Zebrowski, eds., White Wolf, $14.99, 587 pp. (ISBN: 1-56504-985-3).
The Road to Science Fiction, Vol. 4: From Here to Forever, James Gunn, ed., White Wolf, $14.99, 601 pp. (ISBN: 1-56504-822-9).

Science fiction writers struggle constantly to imagine what the future might be like. Some, I think, err by trying to make the future too outré or bizarre, forgetting that no matter what happens to technology, people will remain much the same, and so will their needs. Some err by remembering that but then slighting the technological change, restricting it in either scope or extent, picturing a world with astonishing computer progress, for instance, but no hint of genetic engineering (as in new foods). In either case, writers may achieve crashing thuds or marvelous triumphs; that is, there is a lot more to an SF story than just the technology or just futuristic plausibility or even just the people. It would thus be asinine of me to dump on a story solely for its shortcomings in one or another of these areas (not that I've never done such a thing, you understand . . .).

Still, Shariann Lewitt belongs to the

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second of the two groups sketched above. Her latest novel, **Interface Masque**, centers on a guild system grown up around the growth of the World-Wide Web and Internet, but about the only hint of other technological change lies in the commonness of plastic surgery among the monied. The setting is Venice a century hence, when the guilds or septs occupy the niche once held by merchant banks. They create grand versions of what we know as Web-sites, manage the common ground of cyberspace, handle security, and more. The world is immensely dependent upon them, and they are trusted implicitly.

Meet Cecilie, who has just been told her graduation from apprentice to journeyman depends on her willingness to (and success in) breaching a security system her sisters in Sept-Fortune have built. She is horrified by the breach of trust involved, but she sees no way around it. Not long thereafter, she learns of a scheme for the septs, led by the dark and sinister Sept-Sorian, to hold the world hostage, to seize control and rule for their own greedy benefit. No wonder they all wear masks.

Music is involved here, too. The great Venetian choirs sing classical music to facilitate clear thinking; the jangly, disturbing tunes of Stravinsky, jazz, and rock, once popular, are now practically forbidden. Drawn to the jazz, Cecilie encounters rebels who wish to thwart the septs' scheme to dominate world and Web.

Is this enough material for a novel? Surely, but Lewitt tosses in one more element: in the basement of the septs' virtual Library, Cecilie finds aliens, busily sorting through the files and beaming home reports on humanity. Understanding eludes her, perhaps as it does the aliens, but she can see that they organize data differently, just as jazz organizes music differently.

Aliens are jazz? Well, why not? I think one could develop that thought into quite an academic treatise without having to stretch very far at all. Unfortunately, Lewitt leaves it as little more than a footnote to follow her main story to a decisive conclusion aided by singer Sean, in hiding from a youthful career as an Irish bomb-maker, and runaway David, scion of a wealthy and powerful Roman family.

The story is nicely complemented by the Venetian ambiance, and the Net technology is well imagined. I continually wondered about the rest of the world and why it had apparently frozen in time, but I still enjoyed what Lewitt gave me. I expect you will too.

In **Alpha Centauri**, William Barton and Michael Capobianco display for us a better notion of how pervasive change can be even as the classic human drives continue. The tale begins as Maeru kai Ortega, nanosurgically altered to be both male and female, awakens aboard the *Mother Night,* a slower-than-light starship, among the first to leave the Solar System in desperate search for a new home for the few, the enlightened, the dedicated Daiseijin who have paid their all to fund the ships. The Solar System, you see (no longer just Earth), is vastly overburdened with people, and utter,

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irrevocable, catastrophic collapse is only a century off.

Soon the rest of the crew awakens as well, all but the one whose icebox failed. Among them is Mies Cochrane, whom we quickly realize is the agent of Indigo, an outfit that believes the only way to save humanity is not to flee to the stars, but to vastly trim our numbers. He—like other Indigo agents—carries virus-like "autoviroids," engineered to infect every woman with whom he mates and render them sterile. His mission—and he has no choice in whether to accept it, for he has been programmed as thoroughly as any computer—is to mate with as many women as he can, to seduce, to love, to leave. The worst sort of cocksman. Just the sort of fellow you want in your isolated small group of mixed men, women, and androgynes. Of course, he's not the only one here who is obsessed with reproduction—Captain Ginny has spent her life fleeing the pederasty cult that birthed her; Doc just threw it all away; and Kai wants to have it both ways. Nor is he the only one wearing a mask: "everyone hides behind their own personal mask, peering out through the little eyeholes, waiting for others to slip up, show the disfigurement behind theirs."

The Centaurus system proves to have an ample variety of worlds and moons, and the signs of previous occupancy are everywhere. There are wrecked spaceships, crumbled walls, even intact buildings, but all of them old beyond belief. Indeed, when the crew of *Mother Night* unlimbers its synchronoptic analyzer, a device that reads the footprints left by past events on the underlying quantum reality, they find that the ruins are billions of years old and their creators are as extinct as the biosphere of the world that produced them. They also discover that that world held three sentient species, the Rhinotaurs, their predators the Frogmen, and *their* predators the Leospiders, technologically ascendant, longest lasting.

Where are they now? In hiding? Moved on? I won't say, for Barton and Capobianco put a great deal of effort into leading the reader to the answer. But certainly they faced the prospect of catastrophic extinction just as do the humans of the Solar System whence came *Mother Night*, and the novel's business is the consideration of various possible answers: Indigo's drastic pruning (which finds an interesting echo in Mies Cochrane's eventual fate), the Daiseijin's outward drive, or resignation and even suicide.

Is there resolution? Well, the Centaurus system, however fascinating it will prove to future archeologists, is too worn out to serve as a destination for the Daiseijin. The explorers are stuck. But they do bring the tale to a moral or two concerning the justification of survival: one excavates the past in search of understanding, reconciliation, forgiveness, and—quite cutely illustrated by the old kiddy song about the itsy bitsy spider—"the one real truth about life is, it's do or die. And if you don't *do*, if you turn your back on a life of deeds, you die anyway."

Is this enough? *Alpha Centauri* is an interesting novel, but it is also

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bleak, for it says that when a person or a species runs out of deeds to do, or when understanding and forgiveness are no longer possible, death is all that is left. Surely the naming of the ship after the goddess of death is no accident, even if it is an accident that two very different books use the same goddess so close together in time (see Rachel Pollack's *Godmother Night*, reviewed in June).

Patricia Anthony's *Cradle of Splendor* struck me as "a stern judgment on science, technology, and even rationality." Her latest, **God's Fires**, refines that judgment: her target now is simply rationality, particularly that kind of rationality displayed by people (notably men, here) who are sure they know all the answers and eagerly bend everything to fit.

The setting is Portugal in the mid-1600s, when the Spanish Inquisition was actively hunting out and burning heretics, Jews, and Moslems. Anthony begins by reminding us that not all the Inquisitors were so bad: meet Father Manoel Pessoa, S.J., who is more concerned with sympathy than with heresy and cannot wait to reach the dusty town where he can dip his *pau* in his beloved Berenice, herbalist, Jew, and reputed witch. Yet on this visit he finds the town abuzz. Folks have seen crosses in the sky, angels have seduced young girls, the Virgin Mary has blighted a tree, and a mysterious beam of light has fructified a potato field.

This is not a time for miracles. Anthony goes to considerable pains to show the political situation, the retarded King Afonso, his brother Pedro, the Inquisitor-General Gomes, obscenely fat, self-indulgent, pig-greedy, flatulent, and self-righteous. Pedro marches with English troops. Afonso goes on a quest and winds up near a certain dusty village. Gomes hears of angels and is off to investigate.

Pessoa is doing his best to sort things out when a metal "acorn" crashes and spills three strange beings, small and gray and much more familiar in today's mythology than in yesteryear's. One is apparently dead; the other two are speechless but able to send visions through their huge eyes. Are they angels? Or demons?

Never mind. Just clap them in a cell, and when Gomes arrives send in the girls, the mother, the father, and hold an Inquisitorial trial. Pessoa and the lawyers see no heresy, no cause for *auto-da-fé*, but Gomes is adamant: what is going on here defies all reason, all faith, and all must burn.

And so they do. This is a depressing and beautifully evoked tale, its bleakness leavened by our awareness that it depicts a past from which we have (we fondly believe) risen along a trajectory that Gomes, for one, could see in his time and which he wished desperately to forestall. Yet perhaps he needn't have worried. The Spanish Inquisition ended officially in 1820, with its horrors still more safely past, but Bosnia and Rwanda are very recent history. We remain capable of such horrors.

Indeed, says Anthony, we commit horrors that are similar in kind if not in degree every day, in our own land. Those aliens, so speechless and meek,

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are not there merely for effect. Today's believers consider them the ultimate in night-sweat victimizers. Yet here they become victims, unprotestingly bestowing the blessing of their bodily fluids on all who dip a finger (projecting cylinder) in their wounds. They thus stand for women, but as victimizers victimized they also remind that rationalizing bigots can fall victim to their own fires.

Yet perhaps, says Pessoa by his final example, there is hope. It is possible to reject the worst of the past and nurture the best. To find out how he does this and how he reaches this point in his career, don't miss the book. It's a gem, and it has much more point than most.

At his best, Alan Dean Foster is a very entertaining writer. Unfortunately, he is also very uneven. For evidence, if you need it, I offer **The Howling Stones**, the premise of which is a world whose resources are coveted by the Humanx Commonwealth but some of whose natives just won't cut a deal. They don't need civilized toys, they say.

So, send in negotiator Pulickel Tomochelor, whom Foster insists is renowned for getting the job done, initially bills as modest and unassuming, and promptly presents as an arrogant, insensitive twit who couldn't negotiate his way out of strawberry jam. Indeed, when Pulickel learns that the reason the locals don't need technotoys is that they have their own, green rocks with quite magical powers, he can think of no better way to proceed than to steal a few of the rocks. And the locals are such friendly fellows—albeit insistent on doing things in their own way—that if he had just asked politely . . .

Pulickel is an inconsistent character, not even himself, worse than cardboard. Others are no better. And the green rocks are quite unbelievable, magic wands for an audience that prefers the scifi label to fantasy and understands nothing of feasibility, practicality, or physical reality.

Foster is of course hardly alone here. There's a lot of "Hollywood science" in mass market science fiction. But Foster has handled it better in the past—perhaps because he managed to write less wooden, stiff, and lumpy prose, or did a more convincing job with his characters, or just did another draft. So have others, and this time I suggest that you look for something by one of them.

Is this the end of the saga that began with *2001: A Space Odyssey*? If so, it seems fitting for it to appear just before the eponymous year rolls up on the calendar for real.

Arthur C. Clarke's **3001: The Final Odyssey** begins when the frozen body of Frank Poole, killed and left to drift away in *2001,* is found in the Kuiper Belt. Retrieved, he is awakened to discover that the world has changed drastically while he napped. Yet despite Jupiter as a sun, vacuum power, space elevators, and brain caps, much remains recognizable. For instance, the famous Monoliths are still there, including the giant that blockades Europa and its native species.

When Poole learns that Dave Bowman apparently survived the *2001* de-

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bacle, merged with the Monoliths, and may yet remain in some sense, he leaps to the conclusion that he must visit Europa despite the very effective barrier. He succeeds, he finds Dave, and he learns that there may be a very serious threat to humanity, based on the distance to the nearest of the Monoliths' "supervisors"—just about 500 light-years.

So far the tale is a fairly conventional "Sleeper Wakes" story that shines by virtue of the master who wrote it and of the decades of history that give the overall saga an air almost of history (though note that Clarke insists that he has made changes to keep up with the advance of scientific knowledge; the various Odyssey books are not quite consistent with each other). However, to my mind much of that shine is tarnished by a contrived ending that insists the omnipotent Monoliths are really no better than the supercomputers of 1930s SF that could be stymied by recursive conundrums along the lines of "Whatever I say is false."

Oh, well. The Clarkean imagination is still a wondrous thing, and it has left its mark on an age of science fiction, film, and even science (see below).

To mark the birthday of HAL, the computer Arthur C. Clarke created for *2001* (January 12, 1997), computer scientist David G. Stork has assembled a beautiful package of essays on just how close computers have come to Clarke's vision over the last three decades.

Hal's Legacy: 2001's Computer as Dream and Reality considers artificial intelligence and the ethical questions it arouses, computer emotions and common sense, progress in computer chess, speech synthesis, and vision (including lip-reading), reliability, and more. It all comes out as something of a paean to the power of science fiction to imagine and even shape the future, and certainly as a paean to one of SF's most towering imaginations.

MIT Press has also set up an "unusually informative as well as elegant" Internet site that offers text, graphics, and links related to the text (eight of the book's chapters are there in full). Visit at http://www-mitpress.mit.edu/Hal/.

The New England Science Fiction Association, through its NESFA Press, has embarked on a labor of love: bringing classic science fiction back into print. Modern readers have thus benefited from new editions of Zenna Henderson, Cordwainer Smith, and James White. Now they can treasure **His Share of Glory: The Complete Short Science Fiction of C. M. Kornbluth.**

In his foreword to the book, Frederik Pohl reminds us that Cyril Kornbluth, then a stripling aged 14, was one of the founders of the Futurians, in at the beginning of organized fandom. When Pohl and Wohlheim and Lowndes became magazine editors in the forties, he began to be published. However, he was not for long dependent on his friends, for he had a prodigious talent. Through the forties and fifties his work helped to shape modern science fiction, and some of his

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many collaborations (such as *The Space Merchants,* which he did with Pohl) are classics still in print.

His Share of Glory is a fat book of 56 stories, some of which you have surely heard of, some of which you have seen in lesser imitations. And some of which you will surely greet with a shout of delighted "So that's where I saw that!" recognition, as I did with "The Marching Morons" and "The Education of Tigress McCardle," both of which still offer creative solutions to the population problem. (Hey, it's been awhile!)

The third edition of Damon Knight's classic **In Search of Wonder** is now available, expanded from the 1967 edition by about 30,000 words.

Knight has long been a pithy and insightful commentator on science fiction, and the new material—written mostly a decade or more ago—alters that description in neither jot nor tittle. He has added one chapter of autobiography, several more on Charles Fort, Milford and Clarion, science, defining SF and writing the stuff, expanded his discussion of John W. Campbell, Jr., and made a number of small changes here and there.

If you don't know who Knight is and have never heard of this book, then listen up: Damon Knight has done as much as anyone to shape modern SF. He was responsible for the Milford and Clarion workshops that have either improved or created so many of today's best SF writers. He also was one of the first to view SF novels as a critic rather than as a reviewer. Starting professionally in 1952 (with a few fannish exercises behind him), he held SF to a high standard, and when it fell short, he said so in no uncertain terms. For instance, he said of Jack Williamson's *The Humanoids* that it was ". . . without doubt one of the most important science-fantasy books of the decade [but] It pains me to admit . . . this, . . . because the writing itself is so thoroughly, unremittingly and excruciatingly bad."

You get the idea. He sheds new light on the classics of the field, the books you once thought (and maybe still think) so astoundingly marvelous, and his book is the perfect companion to your collection of favorites.

As Knight notes, the 1950s saw "some of the best science fiction ever to appear in hard covers, along with a fascinating flood of the worst science fiction ever conceived by the mind of man." Today, that flood continues as if writers, readers, and publishers never learned a thing, but reviewers are rarely as frank or as clever as Knight in their comments upon it.

NOTABLE REISSUES

What a treat awaits you! The first volume in White Wolf's Rediscovery series is now available as **Three in Time: Classic Novels of Time Travel**. The lead novel here is Chad Oliver's *The Winds of Time* (1957), concerning aliens stranded on the Earth of fifteen millennia past; Oliver was an anthropologist with the gift of insight, though he did not receive his due as an SF writer in his lifetime; in his introduction, George Zebrowski asserts

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that he wrote as well as Hemingway.

Pamela Sargent introduces the second item here, Wilson Tucker's *The Year of the Quiet Sun* (1970), with similar high praise, though she doesn't mention Hemingway. Nor does Jack Dann in introducing Poul Anderson's *There Will Be Time* (1972), but these too are classic time travel novels, as readable today as they ever were. If you recall them fondly, meet them again. If you never heard of them, what are you waiting for?

Another White Wolf prize is the fourth volume of James Gunn's famed **Road to Science Fiction** anthology, **From Here to Forever** (1982). (Volume three, *From Heinlein to Here,* has been available for several months; I mentioned it last January.) In Gunn's words, the series "tried to trace the development of science fiction from the earliest ancestors of all fiction to its most contemporary expressions." The new edition adds George Alec Effinger's 1988 story, "Schrödinger's Kitten," and the introduction has been updated, but it remains as successful a survey of recent SF as one could wish, essential to every library and every scholar or teacher of the field. ■

ANALOG
SCIENCE FICTION AND FACT

SALUTES THE WINNERS OF THE
1996 NEBULA AWARDS
GIVEN BY THE SCIENCE FICTION
AND FANTASY WRITERS OF AMERICA

Best Novel
SLOW RIVER
Nicola Griffith

Best Novella
"DA VINCI RISING"
Jack Dann
(*Asimov's*, May 1995)

Best Novelette
"LIFEBOAT ON A
BURNING SEA"
Bruce Holland Rogers

Best Short Story
"A BIRTHDAY"
Esther M. Friesner

Grand Master Award
Jack Vance

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BRASS TACKS

Dear *Analog,*

I expect you'll be getting lots of mail, so I'll be brief. G. Harry Stine's column, "The Alternate View," in the February 1997 issue of *Analog,* is largely an excerpt from Scott Adams's book, *The Dilbert Principle,* HarperCollins 1996. See Chapter 14, "Engineers, Scientists, Programmers, and Other Odd People," page 170. Adams seems to be given no credit in the issue.

The bit did circulate in unattributed form around the Internet a couple of months back, which may be where Stine saw it. Alternatively, perhaps both bits of text are derivative from a third, common, source—though I don't recall seeing the joke before Adams's book. At any rate, there would seem to be some copyright conflict present.

L. Drew Davis
drewd@mindspring.com

We bought Mr. Stine's column in good faith that it was his original work, and he maintains that he never saw either The Dilbert Principle *nor any of the similar but unattributed Internet articles until after his column was published. We are trying to determine what actually happened.*

Dear Dr. Schmidt:

I agree wholeheartedly with your editorial in the February 1997 issue.

Use of brains, rational discrimination, and gumption are precisely what our public education system has deliberately taken out of the classroom. These tools are anathema to the liberal mainstream which chooses to attack perceived problems with emotional "all or nothing" responses rather than careful analysis. Can we ever restore rationality without first fixing public education?

Richard D. Glover, P.E.
rdglover@worldnet.att.net

Dear Dr. Schmidt,

I just finished reading your February editorial: "The All or Nothing Fallacy." I am in general agreement with your premise and examples. However, I don't believe you have thought through your example about school uniforms.

At first glance, the uniforms appear to be an attempt to impose conformity as an means of increasing standards and enforcement. I am not sure where you live. However in Los Angeles, where I teach 5th grade, the wearing of uniforms is a question of safety. There are many gangs in the area. Each gang has its own "uniform." This

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may be as simple as how a belt is worn, the length of shorts, a team jacket, shoelace color, type of fabric, or color combinations. A student wearing the wrong colors is at risk of harassment, threats, assault, or even murder. The pressure for uniforms comes in part from parents who are concerned about the safety of their children.

A second and less compelling reason is cost of clothing. In many middle class areas there is a "uniform" imposed by the advertising industry and eagerly accepted by teenagers. Parents can spend hundreds of dollars on ephemeral styles. In these communities, uniforms decrease the pressure to spend large amounts on clothing.

If you want to use the schools as an example of the "All or Nothing Fallacy," you might consider educational fads. Witness the swing between "Whole Language" and "Phonics" approaches in teaching reading. Or the various "New" and "Old" Maths.

The problem with using uniforms is that it is a simplistic answer to a complicated problem. It is more comfortable to impose uniforms than to solve the problems that lead to gang violence. Imposed conformity is easier than regulating companies that depend on advertising directed toward children.

DAVID F EISENBERG
DavidFE@ix.netcom.com

Dearest *Analog* (Stan the Man Specifically),

On this first day of 1997 I say HAPPY NEW YEAR! Now to my comment. I have read your magazine for 24 years. I have never been compelled to reply to an editorial until now. As a degreed petroleum engineer I know that rationality is the only thing that keeps oil and gas coming out of the ground. The only reliable means of finding these commodities is to apply the scientific method. However, the people who actually undertake the tasks necessary to get this stuff produced are mostly ignorant, untrained cattle. I have contracted rig supervisors unable to read, and worked with lease operators unable to add or subtract. These people were trained in public schools during what you called the period of "extreme emphasis on individual freedom." Stan, no one was watching the FARM. The parents were goofing off, and now these kids of the '60s and '70s now have grown kids of their own in the '90s. Society, by adopting "school dress codes" and "teen curfews," is *not* adopting an extreme position but exerting a measure of self-protection. As you acknowledge, thinking is crucial to being a rational being, but these kids can't think rationally! How does a young person today reconcile the conflict between NRA-type gun nuts, TV and movie violence, the misery on international, national, and local news, neighborhood gangs with the preaching of nonviolence by police, schools, and PSAs without enforced discipline? Those "warm fuzzies" can't compete. I am ecstatic about any degree of uniformity imposed on these kids, and their parents. You talk about people of responsibility; I don't think there

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are enough of them out there. Still, I *love* your mag!

CLINT HARMAN

Houston, TX

Dear Stan:

You rarely (if ever) publish more than one round of comments on a given article, so I don't expect to see this letter appear in *Analog,* but I'm still moved to put finger to keyboard over something I consider outrageous. I'm referring to Doug Larsen's response to Colin Helmer's letter in the February 1997 issue of *Analog.*

When I read Doug's "The Alicia Revolution" I was not too concerned over the possible inaccuracies that seemed to have upset Colin. As usual I accepted them for the sake of the story, and also have in mind your often-repeated comment that authors do not necessarily agree with what their characters say (and do), and so I was not perturbed by the Thusbammannan ambassador's actions. On the other hand, when Doug responds to a reader's letter, he is then speaking with his own voice (as opposed to a character's) and must take responsibility for what he says.

He finds "The fact that ambassadors don't have the authority to remove American citizens from a foreign country when it is in the best interests of the citizen . . . is incredible to me." Since when is an ambassador the judge of what is in the best interest of another free, adult US citizen? More importantly, even if he is right, since when does the US government have the right to tell a free, adult, non-law-breaking US citizen that he may or may not do anything against his own best interests?

Examples are, of course, numerous: smoking is a good example of government permitting citizens to engage in harmful actions. On the other hand, where would air travel be if the Wright brothers, and their predecessors, were forbidden to carry out the (fairly dangerous) experiments in flight that were required in the early stages? More in line with the theme of Doug's story, where would we all be if Patrick Henry and the other patriots of pre-Revolutionary America had been prevented from risking their lives, security, and comfort for the same goals that the story proposed?

Having read your editorials for quite a long time now (my *Analog* pile is almost five feet high) I know that you agree with me: that an adult has the right to choose his own course of action without undue interference, and, of course, take responsibility for the outcome of those actions, be they good or bad. Thus I'm somewhat surprised that you didn't take Doug to task yourself for this pretty arrogant pronouncement.

On a more pleasant topic, I have a comment about Warren Rayle's letter (same issue). Toward the end he mentions Poul Anderson's quote of Isaac Asimov's comments about the effect of chaos on the possibility of actually creating Asimov's psychohistory (or some analog thereof). Warren (and Poul and Isaac, too, surprisingly) seems to forget that psychohistory deals with large masses of people. To create an analogy with the physical

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sciences: there is nothing more chaotic than the random motion of the atoms of a gas, yet there are few things more exact than the gas laws—with enough individual particles (people) the chaos'"averages out," which is the central thesis of psychohistory. Chaos is a matter of scale. To illustrate, another example would be the weather: this is considered one of the prototype examples of chaotic behavior in nature, yet summer is always warmer than the winter preceding or the one following; the scale isn't quite large enough to be more precise, but the point is made.

HOWARD MARK, PH.D.
Suffern, NY

The author replies . . .

You underestimate Stan. He is an editor, a source of ideas, a quality judge, a source of inspiration, and many other things. He is not, however, the Thought Police. If you think he wants only one point of view to be printed in his magazine, you didn't understand a word of his editorials.

The examples you give of people choosing their own courses of action without undue interference are interesting, but they miss the crux of the assumption I made: that things are different when you're traveling in a foreign country. When an American travels in a foreign country, s/he does so with a passport issued by the American government. I was under the assumption (which was erroneous, as Colin Helmer pointed out) that a condition of being issued a passport was being subject to the orders given by American government officials in that country. So my "pretty arrogant pronouncement" didn't apply to free, adult, nonlawbreaking citizens of the United States when they were in their own country. A careful reading of my reply would have avoided that confusion.

When I was in college I studied the Philippines closely (on which I very loosely based Thusbammanna). When it looked like they had a chance to get rid of their corrupt, brutal dictator and get a popularly elected government, I watched with bated breath. Very delicate negotiations were underway between their government and ours, which were eventually successful. Marcos finally left, liberating millions from his presence. If some lone American had showed up in the streets and stirred up something that ruined the process, I would have been pretty pissed off.

That was the basis from which my opinion was formed. And I intend to continue holding this opinion whether I have your permission or not.

DOUG LARSEN

To the Editor:

I just finished reading the February 1997 issue of *Analog* and I am very curious about one story: "The Play's the Thing." It seemed that there was something different about it and I couldn't place what it was for a few minutes. I finally realized what it was. The story was done in full page format and not in two columns. The publishers of any magazine or book would have "fits" on seeing a different format in the middle of the book. This could have been a printer's error, but somehow I don't think so. My wife

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and I were in the publishing business for many years and this is very intriguing. It would be nice to know what happened.

Thank you for any information.

LEE ALTMAN

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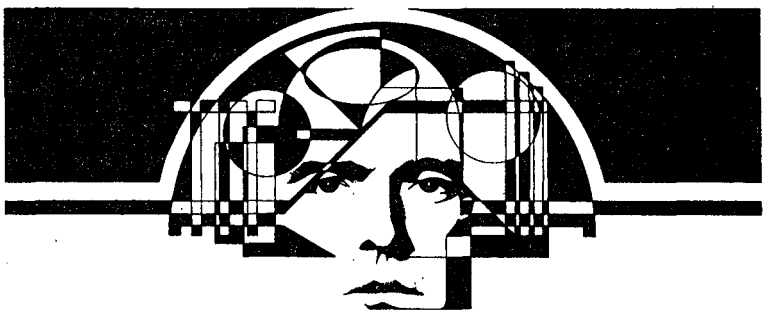
No, the different format for "The Play's the Thing" wasn't a mistake. It's true that we normally prefer to use a two-column format through the issue, but sometimes a particular story or article has special requirements that take precedence over that preference. In this case it was the rebuses, which we wanted to reproduce exactly as they'd been drawn rather than breaking them up into several lines. In Michael F. Flynn's "Captive Dreams" (August 1992) it was the peculiar nature of the narrative, which at times split into five parallel streams. In each case, it was easier and less confusing to fit a special oddity of a particular story into a single-column format than the usual two-column. ■



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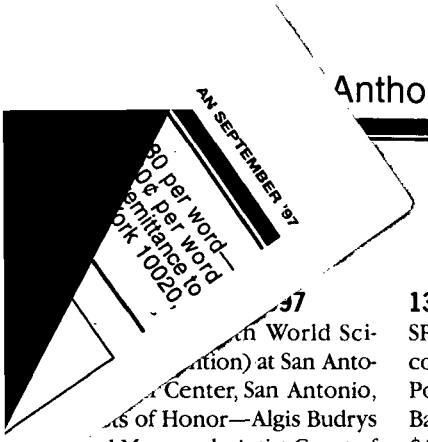

...97

...n World Sci-...ition) at San Anto-... Center, San Antonio, ...s of Honor—Algis Budrys ...nael Moorcock; Artist Guest of ...or—Don Maitz; Fan Guest of Honor—Roy Tackett, TM—Neal Barrett, Jr. Registration until 31 July 1997 $135; supporting $25; children +3 to +12 $40, children -0.75 to +3.0 FREE (age as of 29 August 1997). This is the SF universe's annual get-together. Professionals and readers from all over the world will be in attendance. Talks, panels, films, fancy dress competition—the works. Info: LoneStarCon 2, Box 27277, Austin, TX 78755-2277. (512) 435-7446 (voice), (512) 435-7747 (fax), lsc2@io.com

4–7 September 1997

SHORECON '97 (New Jersey area SF conference) at Hilton Cherry Hill, Cherry Hill, N.J. Guest of Honor: Lawrence Watt-Evans; Artist Guest of Honor—Melissa Benson. Registration—$20 until 21 August, $25 thereafter. Info: Shorecon '97, c/o Multigenre, Inc., 266 Spruce Drive, Brick, NJ 08723-6528; (908)262-9249. Email: info@multigenre.com; URL: http://www.multigenre.com

13–14 September 1997

SPACECON XI (Space 1999-oriented conference) at Days Inn/City Center, Portland, Ore. Guests: Barry Morse, Barbara Bain, Nick Tate. Registration: $50. Info: SpaceCon XII, 3196 SE 136th Avenue, Portland, OR 97236. (503) 760-7418. Email: twynn@pdx.afres.af.mil.

3–5 October 1997

ARCHON 21 (St. Louis area SF conference) at Gateway Center, Collinsville, Ill. Guest of Honor—Lois McMaster Bujold; Artist Guest of Honor—Mary Hanson-Roberts; Fan Guests of Honor—Barbara Stewart & Tim Hays; Special Guest of Honor—George R.R. Martin. Registration—$20 until 31 August 1997, $25 until 26 September and at the door. Kids 6-12, $5. Info: Archon 24, Post Office Box 483, Chesterfield, MO 63006-0483. (314) 326-3026. Email: zellich@il.net

Convention attenders: When calling conventions for information, do not call collect and do not call too late in the evening. It is best to include a S.A.S.E. when requesting information; include an IRC if the convention is in a different country.

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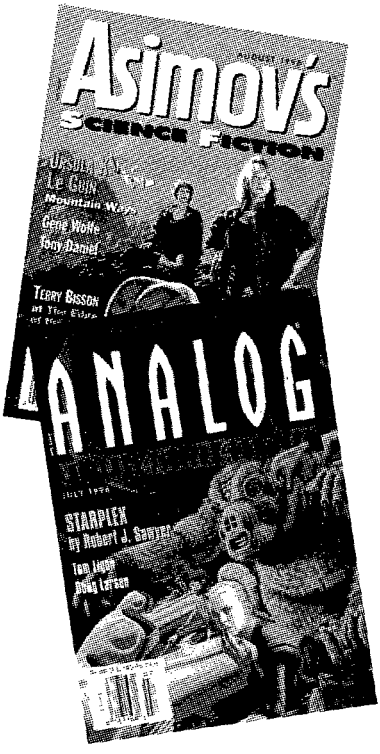

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